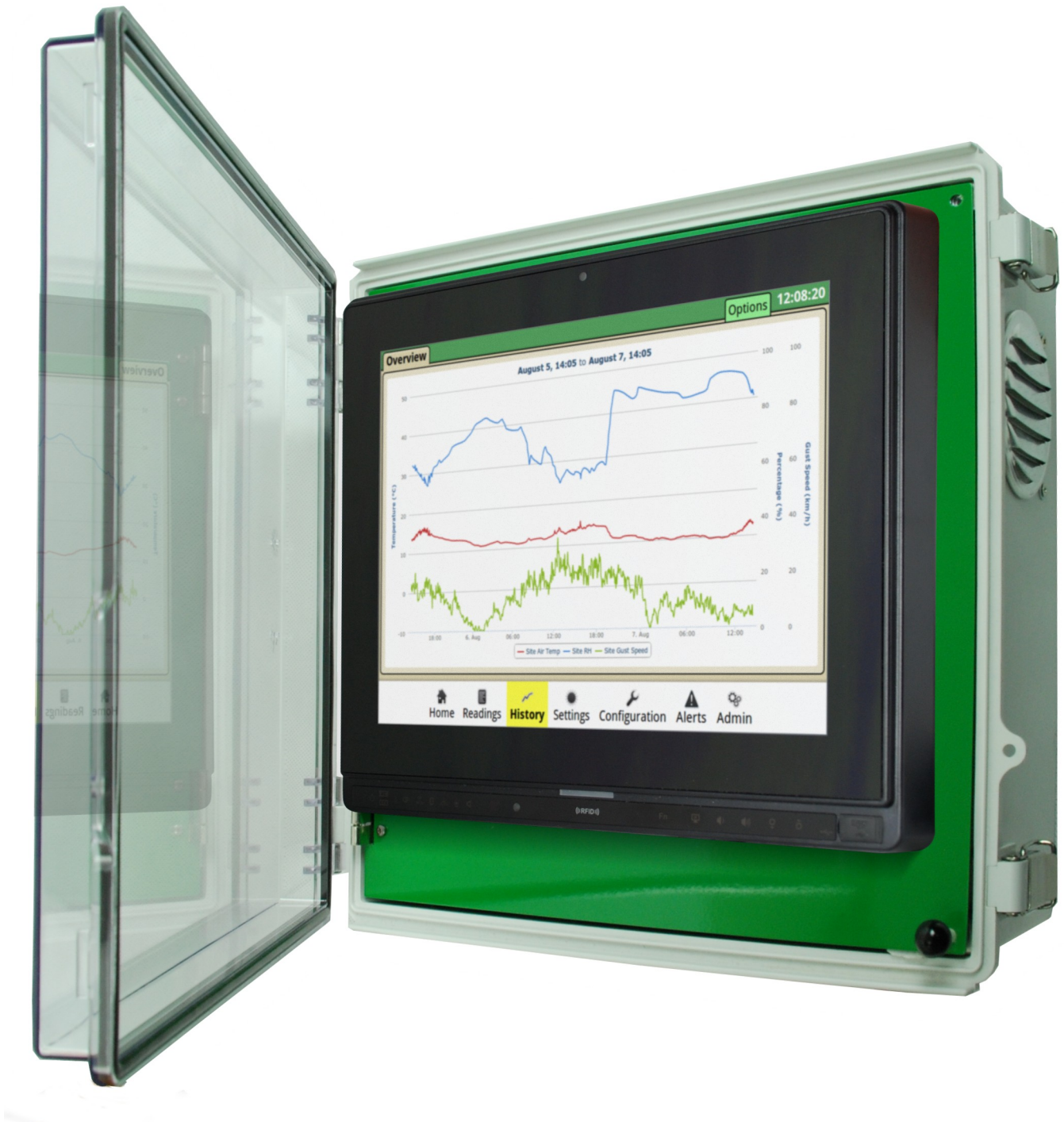
Multigrow

User manual



Climate - with up to 8 compartment managers
Fields - with up to 8 field managers
Irrigation - with up to 8 irrigation system managers
Monitors - with up to 8 independent monitor managers
Weather - with up to 2 weather stations

From:

Autogrow Systems Ltd
New Zealand

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Table of Contents

Introduction 12
- Document Conventions 12
- Overview 12
- What can it do? 12
  - Climate 13
  - Irrigation 13
  - Fields 13
  - Monitors 14
  - Weather 14
- Network Connectivity 14
- The Communication Buses 15
  - Separating Power Domains 15

Getting Started 16
- Logging in 16
- Accessing your Multigrow over the network 17
  - Setup the network 17
- Accessing your Multigrow over the Internet 17
  - Setup the firewall 17
- Alert Notifications 17
- Basic Overview 17
- Navigational Sections 18
  - Home 18
  - Readings 19
  - History 19
  - Settings 19
  - Configuration 19
  - Alerts 19
  - Admin 19
- Configuration 19
  - Basic User Interface Patterns 19
  - Activating configuration or settings changes 20

Admin 21
- Access 21
  - Administration and passwords 21
  - Passwords and Setting classifications 21
- Time 21
  - Setting the date and time 22
  - Setting the timezone 22
  - Setting Sunrise and Sunset times 22
- Network 23
  - Automatic Addressing 23
  - Static Addressing 24
- Services 24
- Power 24
  - Restarting 24
  - Shutdown 25
- Sensor Devices 25
- Output Modules 26
  - Single 26
  - Paired 26
- Independent Sensors 27

Climate 28
- Adding a new Compartment Manager 28
- Setting up a new Compartment 29
  - Current Readings 29
  - Set Points 30
  - Targets 30
  - Technical 31
  - Influences 31
  - Sensors 33

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Alerts....34
Common Concepts....35
Time Period Modes....35
How Offsets Work....35
How Deadbands Work....35
Cooling Manager....35
Purge Manager....37
Vents....38
Configuration....38
Settings....39
Reading....46
Fans....47
Fan Pad....50
Configuration....50
Settings....53
Readings....56
Cooling....56
Heating....59
Dehumidify....63
Configuration....63
Settings....63
Readings....64
Screens....65
Configuration....65
Settings....67
Readings....72
How does it know which Combination is the best for the conditions?....73
Fogging....75
Configuration....75
Settings....77
Misting....79
Configuration....79
Settings....79
Readings....81
Lighting....82
Configuration....82
Settings....83
Readings....85
CO2....86
Configuration....86
Settings....86
Readings....87
Heatpumps....87
Hydronic....87
Configuration....88
Settings....90
Readings....94
Irrigation....95
Installation....95
Summary....96
Configuration....96
Adding a new irrigation system....96
Main Tanks....96
Main Sensors....97
Main Sensor 1....97
Main Sensor 2 & 3....98
Settings....99
Irrigation Systems....99
Main Tanks....99
Main Sensors....101
Overview....101
Additional Options....103
Readings....110
Irrigation Systems....110

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Main Tanks....110
EpM Sensor's....111
Continuous System....111
Suggested Layouts....111
Simple gravity fed system....111
General....112
Configuration....112
Time Periods....112
Configuring a Time of Day variable....113
Using time periods....113
Settings....113
Readings....114
Info....114
Water System....115
Nutrient....116
pH....116
Active Program....116
Dosing....117
Configuration....117
Install....117
Nutrient Dosing....117
pH Correction....118
Settings....118
Readings....122
Nutrient....122
pH....123
Dose Circulation Pump....123
Stir Pump....124
Recipe....124
Program....124
Recipes....125
Water System....127
Configuration....127
General....127
Filter Flush....127
Flow Triggered Output....127
Water Source....128
Settings....131
Readings....137
General....137
Pump....137
Flow Triggered Output....138
Stir Pump....138
Water Source....139
Tank Readings....139
Flow Rate....140
Filter Flush....141
Settings....141
Readings....143
Triggers....143
Outputs....144
Sensors....144
Configuration....144
Measure EpM....144
Check EpM....145
Source EpM....145
Solar Sensor....145
Overview....146
Additional Options....147
Readings....155
EpM Sensor's....155
Solar Sensor....155
Alarms....156
Inline System....157
Typical system....157

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Configuration....158
General....158
Master Valves....158
Time Periods....159
Configuring a Time of Day variable....159
Using time periods....160
Settings....160
Readings....161
Info....161
Group Info....162
Active Program....163
Readings....163
Water System....164
Nutrient....165
pH....165
Groups....166
Settings....166
Group....167
Program....170
Triggers / Automatic....170
Periodic Triggers....172
Manual....176
pETo Volume....179
Modifiers....181
Settings....183
Readings....186
Groups Status....186
Disabled....186
Off....186
Pending....186
Pending (Batch System)....187
On....187
On (Multiple Stations)....187
On (Pending)....187
Paused....187
Interrupted....188
Dosing....188
Install....188
Nutrient Dosing....189
pH Correction....189
Settings....189
Readings....196
Nutrient....196
pH....196
Sample Pot Pump....197
Stir Pump....197
Recipe....198
Stations....198
Configuration....198
General....198
Stations....198
Readings....200
Water System....200
Configuration....200
General....200
Filter Flush....201
Flow Triggered Output....201
Water Source....202
Settings....204
Readings....210
General....210
Pump....211
Flow Triggered Output....211
Stir Pump....212
Water Source....212
Tank Readings....213
Flow Rate....213

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Filter Flush....214
Settings....214
Readings....216
Triggers....217
Outputs....217
Sensors....217
Configuration....218
Measure EpM....218
Check EpM....218
Source EpM....219
Solar Sensor....219
Overview....220
Additional Options....221
Readings....228
EpM Sensor's....228
Solar Sensor....229
Alarms....229
Batch System....231
Suggested Layouts....231
Simple gravity fed system....231
Typical system....232
Configuration....232
General....232
Master Valves....233
Time Periods....234
Configuring a Time of Day variable....234
Using time periods....235
Settings....235
Readings....236
Info....236
Group Info....237
Active Program....237
Readings....238
Water System....238
Nutrient....239
pH....239
Groups....240
Settings....240
Group....241
Program....244
Triggers / Automatic....244
Periodic Triggers....246
Manual....250
pETo Volume....253
Modifiers....255
Settings....257
Readings....260
Groups Status....260
Disabled....260
Off....261
Pending....261
Pending (Batch System)....261
On....261
On (Multiple Stations)....261
On (Pending)....261
Paused....262
Interrupted....262
Dosing....262
Install....263
Nutrient Dosing....263
pH Correction....263
Settings....264
Readings....267
Nutrient....267
pH....268
Dose Circulation Pump....269

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Recipe....269
Batch Tank....270
Configuration....270
General....270
Tank Level Sensors....270
Float Sensors....271
Additional Outputs....272
Settings....273
General....273
Level Sensors....273
Fill Cycle....274
Stir Cycle....274
Stir Cycle Shorten....275
Additional Outputs....276
Readings....276
General....276
Fill....276
Stir....277
Tank Level Sensor....277
Additional Outputs....278
Stations....278
Configuration....278
General....278
Stations....278
Readings....279
Water System....280
Configuration....280
General....280
Filter Flush....280
Flow Triggered Output....280
Water Source....281
Settings....284
Readings....290
General....290
Pump....290
Flow Triggered Output....291
Stir Pump....291
Water Source....292
Tank Readings....292
Flow Rate....293
Filter Flush....294
Settings....294
Readings....296
Triggers....296
Outputs....297
Sensors....297
Configuration....297
Measure EpM....297
Check EpM....298
Source EpM....298
Solar Sensor....298
Overview....299
Additional Options....300
Readings....308
EpM Sensor's....308
Solar Sensor....308
Alarms....309
Watering System....310
General....310
Master Valves....311
Time Periods....312
Configuring a Time of Day variable....312
Using time periods....313
Settings....313
Readings....314

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Info....314
Group Info....315
Readings....315
Water System....316
Groups....317
Settings....317
Group....318
Program....321
Triggers / Automatic....321
Periodic Triggers....323
Manual....327
pETo Volume....330
Modifiers....332
Settings....334
Readings....337
Groups Status....337
Disabled....337
Off....338
Pending....338
Pending (Batch System)....338
On....338
On (Multiple Stations)....338
On (Pending)....338
Paused....339
Interrupted....339
Stations....339
Configuration....340
General....340
Stations....340
Readings....341
Water System....341
Configuration....341
General....341
Filter Flush....342
Flow Triggered Output....342
Water Source....343
Settings....345
Readings....351
General....351
Pump....352
Flow Triggered Output....352
Stir Pump....353
Water Source....353
Tank Readings....354
Flow Rate....354
Filter Flush....355
Settings....355
Readings....357
Triggers....358
Outputs....358
Sensors....358
Configuration....359
Measure EpM....359
Check EpM....359
Source EpM....360
Solar Sensor....360
Overview....361
Additional Options....362
Readings....369
EpM Sensor's....369
Solar Sensor....370
Alarms....370
Day Tank System....371
Suggested Layouts....371
General....371
Master Valves....372

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Time Periods....373
Configuring a Time of Day variable....373
Using time periods....373
Settings....374
Groups....374
Settings....375
Group....376
Program....379
Triggers / Automatic....379
Periodic Triggers....381
Manual....385
pETo Volume....388
Modifiers....390
Settings....392
Readings....395
Groups Status....395
Disabled....395
Off....396
Pending....396
Pending (Batch System)....396
On....396
On (Multiple Stations)....396
On (Pending)....396
Paused....397
Interrupted....397
Dosing....398
Configuration....398
Install....398
Nutrient Dosing....398
pH Correction....399
Settings....399
Readings....403
Nutrient....403
pH....404
Dose Circulation Pump....404
Stir Pump....405
Recipe....405
Stations....405
Configuration....406
General....406
Stations....406
Readings....407
Water System....407
Configuration....407
General....407
Filter Flush....408
Flow Triggered Output....408
Water Source....409
Settings....411
Readings....417
General....417
Pump....418
Flow Triggered Output....418
Stir Pump....419
Water Source....419
Tank Readings....420
Flow Rate....420
Filter Flush....421
Settings....421
Readings....423
Triggers....424
Outputs....424
Sensors....424
Configuration....424
Measure EpM....424
Check EpM....425
Source EpM....425

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Solar Sensor....426
Overview....426
Additional Options....428
Readings....435
EpM Sensor's....435
Solar Sensor....436
Alarms....436
Monitors....438
Configuration....438
Environment....440
Root Zone....441
Settings....442
Readings....446
Fields....448
Introduction....448
Adding a new Field Manager....449
Adding a new Field....449
Site Temperatures....450
Sensors....450
Configuration....452
Setting up a field....452
Walls....456
Roofs....458
Screens....459
History....471
Interface Overview....471
Default View....472
History Options Menu....473
History Options....474
Selecting Series....474
Setting Series Colour....475
Selecting Date Range....475
Historic....475
Live....475
Table View....476
Presets....476
Creating a preset....477
Loading a preset....477
Deleting a preset....477
Setting a default preset....478
Changing the X axis scale....478
Configuration....478
Settings....479
Readings....480
Alerts....481
Alert types....481
How to tell if you have active alerts....481
Active....481
Muted....482
New....482
Upcoming....482
Errors....482
Log....483
Troubleshooting....484
Communications....484
No devices are communicating and there is no USB or ethernet....484
Checking the communications....484
Network....485
Check that the Multigrow is physically connected to the Network....485

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Check the link lights on the Multigrow....485
History....487
I can't view history, the message "Couldn't find available scopes for this page" is shown....487
The history loading screen is taking forever!....487
Why are there question marks on the table?....488
Why are there exclamation marks on the table?....488
Irrigations....488
My irrigations are getting triggered by solar during the night!....488
Generic....488
I am seeing "XX" displayed where there should be readings....488
I am seeing some other unexpected behaviour that is not listed here....489
Appendix....489
Licences....489

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Introduction

This document provides information to enable an end user of the Autogrow Multigrow Controller to install, setup, configure and manage their system.

Document Conventions

The following conventions are used within this document.

- ***Bold Italics*** refer to other sections of the document
- **Bold text** refers to a field or button that needs to be pushed
- "*Italics in quotes*" refers to a value that is to be entered in a field

When referring to a specific part of the user interface in the Multigrow software, the following format will be used determine the location: **Navigation Section > Primary Menu tab > Secondary Menu tab > Tertiary Menu tab**. This format describes the drilling down into part of the user interface. An example of this format would be **Configuration > Climate > Tomatoes > Vents**. You can check the section titled ***Basic Overview*** under the **User Interface** section for visual definitions of each part.

Overview

The Multigrow comes housed in a splash-proof cabinet and is available in two formats; the flagship model with 12" touchscreen, and the screenless model.

TS-12 Touchscreen

SL-12 Screenless

Apart from the obvious lack of a screen they both offer the same feature set. To use the screenless Multigrow a mouse, keyboard and screen can be attached, or once configured, it can be accessed over the network.

The Multigrow has a built in webserver so the same screen that you see on the touchscreen (or attached screen) is seen when accessed over the network using your web browser.

What can it do?

The Multigrow has 5 main functions, each with individual managers that enact control.

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- **Climate** - with up to 8 compartment managers
- **Fields** - with up to 8 field managers
- **Irrigation** - with up to 8 irrigation system managers
- **Monitors** - with up to 8 independent monitor managers
- **Weather** - with up to 2 weather stations

> In some situations it may be possible to have more than the maximum managers specified above, but you should liaise with Autogrow Systems or your distributor if you require this

Climate

Climate management through the control & operation of vents, fans etc is facilitated through the Climate manager.

Each compartment manager can control the following equipment to ensure growing areas are kept within the optimal targets:

- Vents
- Heaters
- Coolers
- Lighting
- HAF fans
- Fan Pad
- Misting
- Fogging
- Wet walls
- Screens
- Dehumidifiers
- CO_2 injectors
- Heatpumps
- Hydronic heating

Irrigation

Irrigation techniques from NFT (Continuous), Batching all the way through to direct inline injection fertigation can be implemented within the Irrigation manager.

The following types of irrigation systems can be setup:

- Continuous
- Watering
- In line injection
- Batch
- Watering + Dosing

Irrigations can be triggered by the following:

- Manual
- Schedule
- Solar
- Evapotranspiration (pseudo)
- Frost
- Timer

Fields

Covered cropping in open-fields through the use of Retractable roofs/walls is managed through the Fields manager.

- Roofs
- Walls
- Screens

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Monitors

The following types of monitors can be setup:

- **Rootzone**
    - Runoff
    - Irrigation
- **Environment**

These monitors will alert you if readings go outside of the specified ranges.

Weather

The weather stations report on the following conditions:

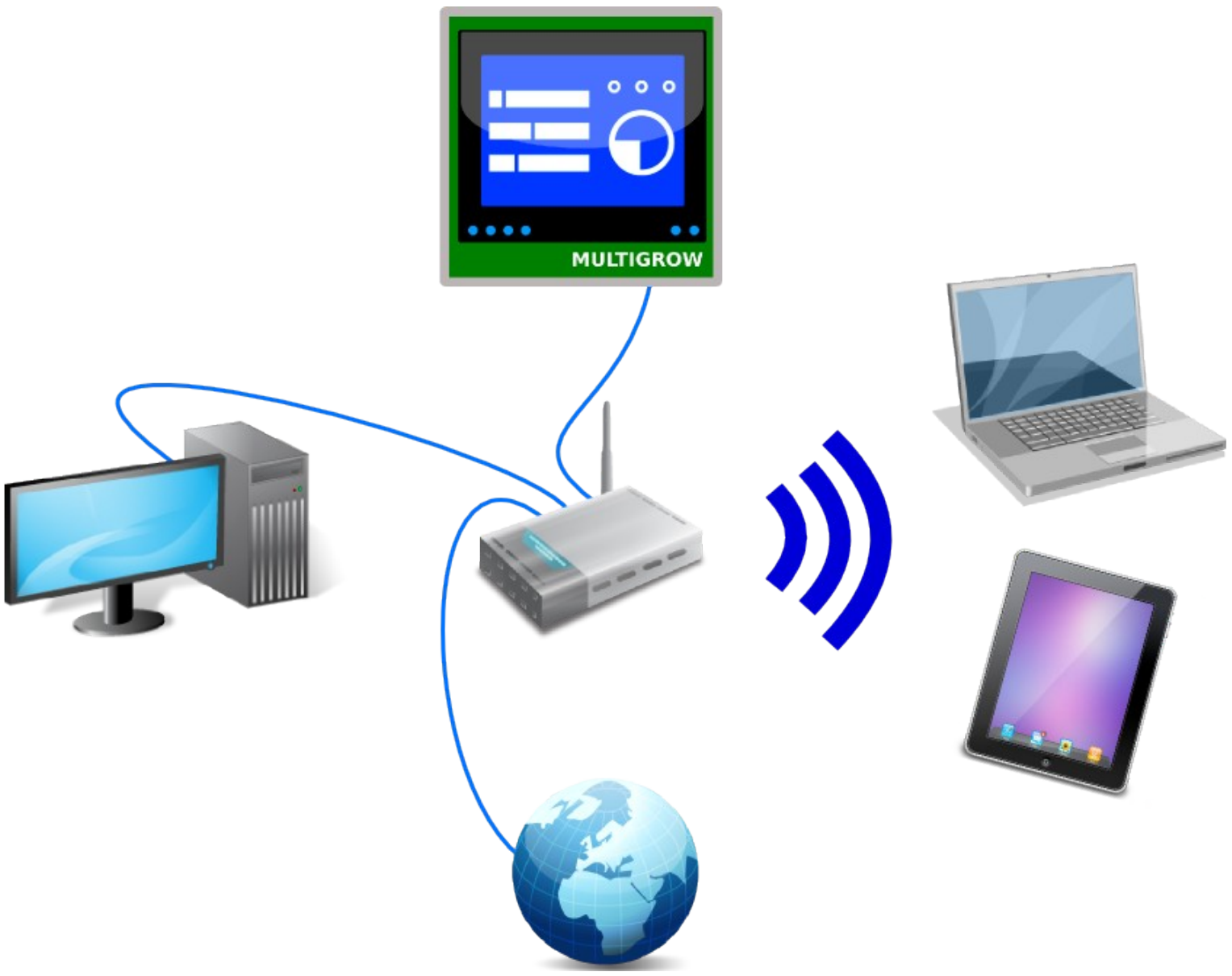
- Air temperature
- Relative humidity
- Barometric pressure
- Wind speed
- Wind direction

Network Connectivity

Attaching the Multigrow to your Local Area Network (LAN) will allow greater flexibility with how you use your controller. You will be able to access it from a desktop computer like a normal website. If you have a Wifi access point attached to your LAN you could even check your readings from a tablet while walking around your greenhouse.

Secure remote access of your Multigrow controller from anywhere in the world is possible using the *Device Management System* at https://my.autogrow.com for a small subscription fee.

Below is a typical network configuration showing all devices on the network connecting through a common gateway (modem/router). Wireless devices can access the Multigrow, as can wired devices and all are able to access the internet.



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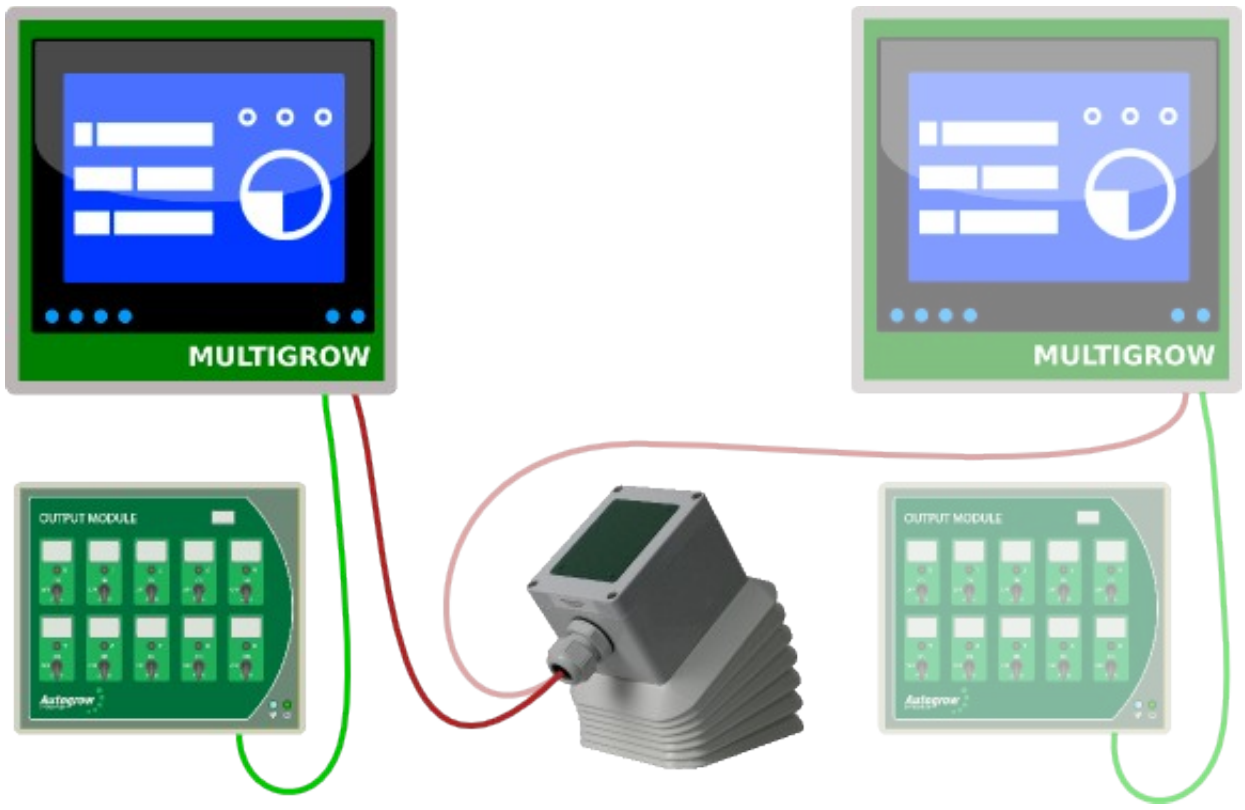
The Communication Buses

The Multigrow system has two communication buses. Peripherals such as output modules and environment sensors connect to the main bus. This bus is used to request readings and send control decisions.



The main bus contains all the peripherals which provide sensor readings and control horticultural equipment. The weather bus contains weather stations and is isolated from the main bus to prevent damage to peripherals in case lightning strikes the exposed and elevated weather station.

Peripherals on the main bus can only talk to a single Multigrow, while the weather station bus can be shared between Multigrows.

Both buses use RS485 communications and run on low cost CAT5e data cable which can be up to 1600m long. The connected peripherals are smart devices. The Multigrow controller supervises the system and makes high level control decisions. It then passes those decisions over the bus to the output modules which carry out the control (e.g. move vent 1 to 65% open). The output module takes care of the precise times to achieve the task and when it is finished it reports back to the controller that it is complete. The peripheral devices continually check themselves and if they become faulty will disconnect from the bus. The Multigrow will notice that the device is missing and raise an alert.

Separating Power Domains

The power supply and communications between the weather station bus, main bus, and controller need to be completely separated. We call these power domains. Each power domain contains protection to ensure that any power issues stay within their respective domain and don't damage other parts of the system. This is so that if the weather station is hit by lightning (or induced voltage from lightning across the sky) then damage will be restricted to the weather station bus, and not the controller or main bus. Similarly, if there are power problems on the main bus, neither the controller or weather station bus will be affected.

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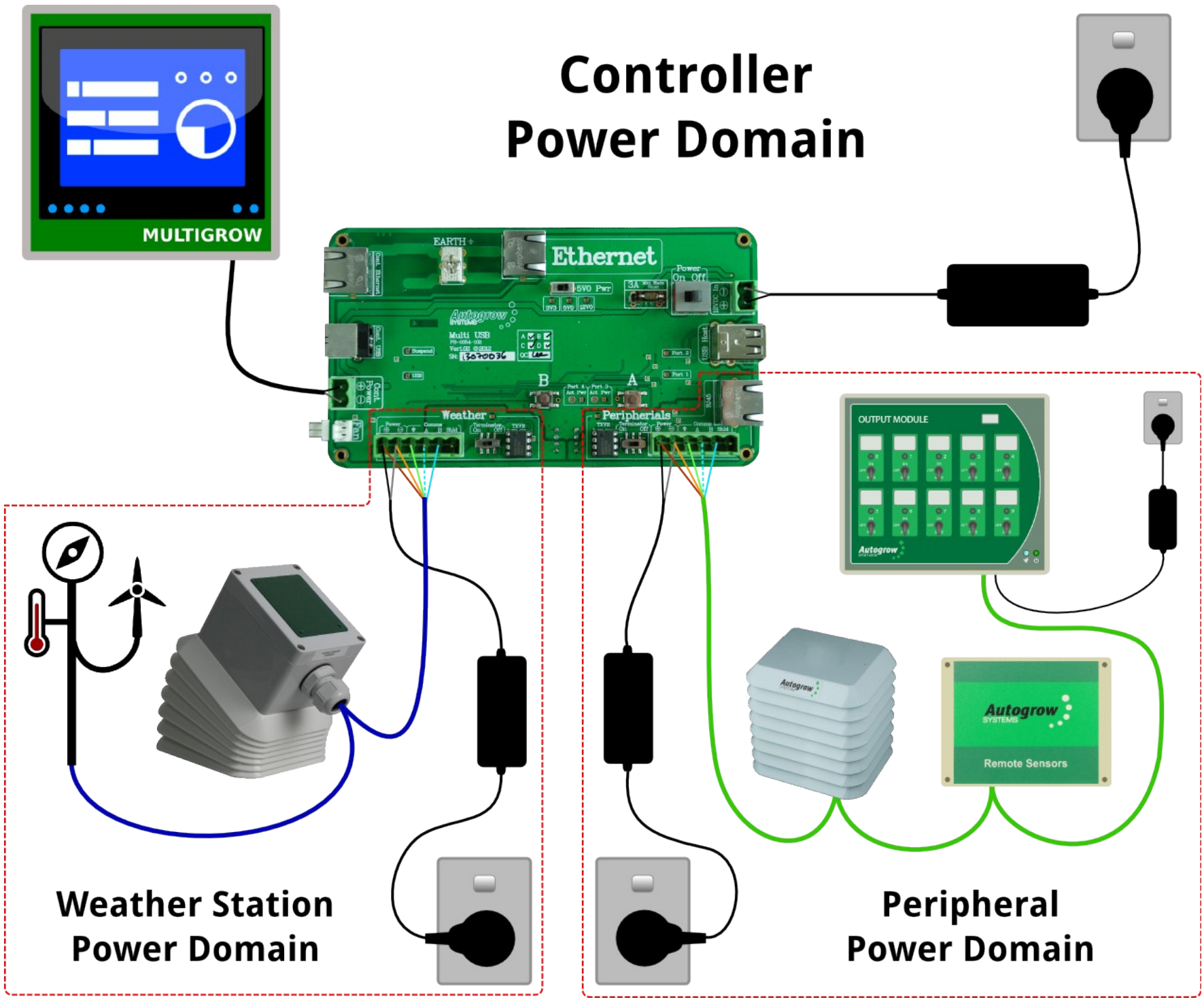

Therefore, it is imperative that there are no breaches of the power domains. Running the weather station power from the 12v fan for example, would cause the controller to be damaged or destroyed if there was a lightning strike to the weather station. Warranty claims in situations such as this would be null and void.

Getting Started

Logging in

There are four levels of user access available on the Multigrow. Which one you log into depends on the type of settings you need to change. Using the correct level of access will ensure that no unexpected changes happen.

User Level	Purpose	Default Password
Basic	Allows all readings and settings to be viewed only	11
Grower	Allows everyday settings to be changed	22
Advanced	Allows the everyday and advanced settings to be changed	33
Administrator	Allows configuration and access to technical settings	44

It is important that you change the password as soon as logging in. The default password is not secure as anyone reading this manual will know the passwords.

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Accessing your Multigrow over the network

Setup the network

Configuring the network will allow you to connect to the Multigrow using your phone, tablet, laptop, desktop or other internet connected device.

Once you have configured the network, you can access your Multigrow over your local area network by opening a browser and navigating to the Multigrow's web address. The address will be different depending on the IP address shown on the Multigrow. For instance, if the Multigrow's IP address is **192.168.0.100** then the web address will be **http://192.168.0.100:8080**.

> Most major browsers are supported:
>
> - Safari
> - Firefox
> - Chrome

You can access the Multigrow on any device connected to your network which can browse the internet.

Accessing your Multigrow over the Internet

For a small subscription fee you can access your controller using our secure portal at **https://my.autogrow.com**. From here you can access your Multigrow from any device that can access the internet. Additional benefits to subscribers are email/SMS alerts and remote backups of their configurations.

Setup the firewall

If your Multigrow is installed in a medium to large business network there may be security restrictions in place in form of a firewall. This can stop your Multigrow communicating with our remote access server and limit the support that can be provided by both your distributor and Autogrow Systems Limited.

Please contact Autogrow Systems or your distributor if you need further advise on how to configure your corporate firewall.

Alert Notifications

Your Multigrow can raise different types of alerts to notify you of potential issues. Normally this can be viewed on the home page. There are warning, alarm and error alerts.

By using **https://my.autogrow.com** you can configure email and SMS alert notifications as well as get more types of alerts such as:

- Online
- Offline
- Shutdown
- Restart
- Started

> A subscription is required for services such as SMS alerts and Remote access via our Portal at my.autogrow.com.

Basic Overview

> For more information on the specific navigational sections, check the section below titled ***"Navigational Sections"***

Below is basic overview of the general layout of the Multigrow user interface.

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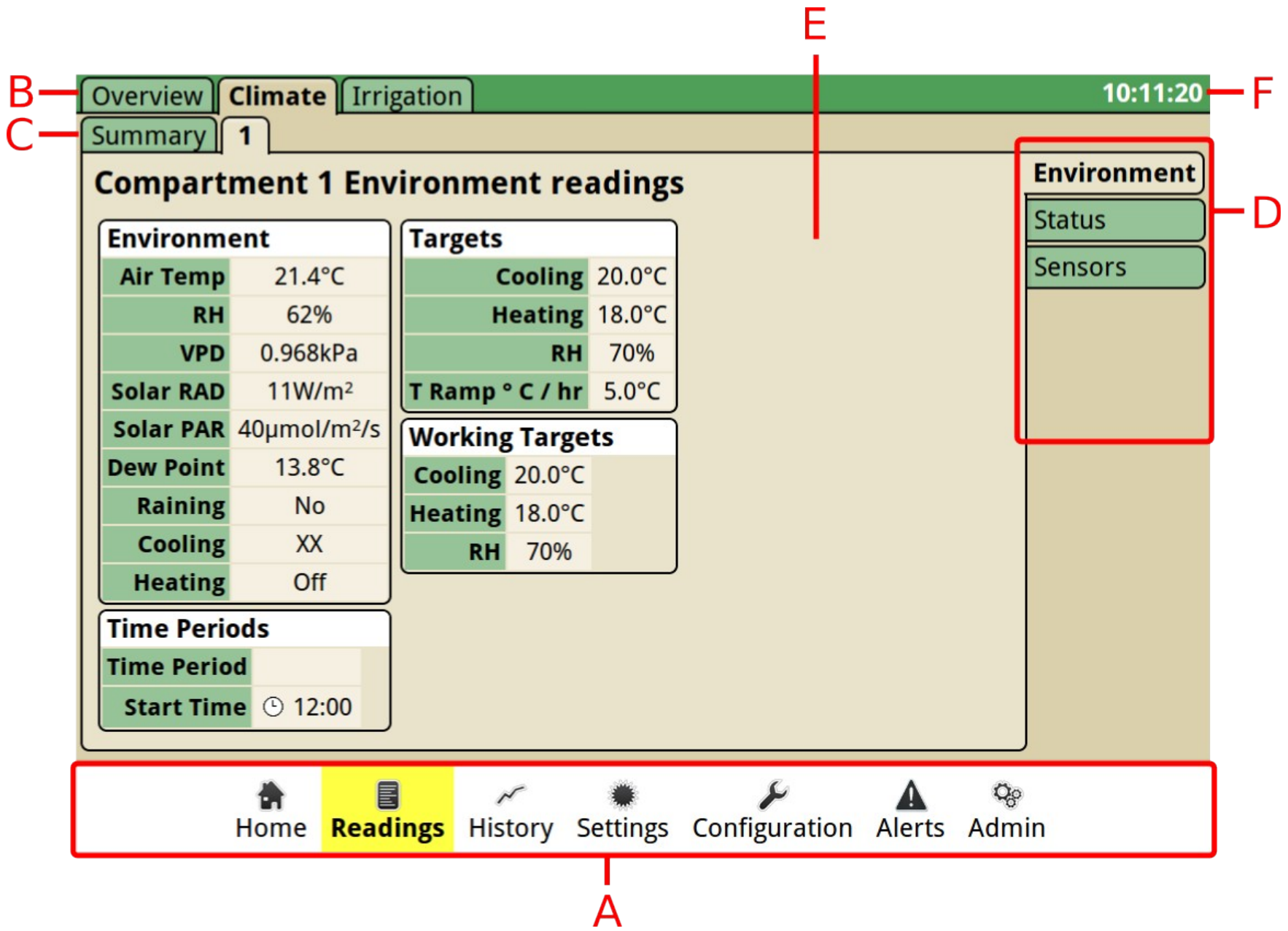

Annotation	Name	Description
A	**Navigation Bar**	The Navigation Bar is always visible and allows you to navigate between the different navigational sections of the Multigrow interface. Depending on the level of user access, some sections may not be visible.
B	**Primary Menu**	The Primary Menu contains tabs for the *Functions* within the current navigational section. In most navigational sections this will contain tabs corresponding to the main functions of the system (e.g. Climate, Irrigation etc)
C	**Secondary Menu**	The Secondary Menu contains tabs representing individual *Managers* of the function selected in the Primary Menu. For example, when the Climate *Function* is selected in the Primary Menu, a Climate Summary along with tabs for the Climate Compartment *Managers* will be shown in the Secondary Menu.
D	**Tertiary Menu**	The Tertiary Menu contains tabs representing *Features* for the *Manager* selected from the Secondary Menu. For example, when a Climate Compartment *Manager* is selected from the Secondary Menu, *Features* relating to climate control will appear in the Tertiary Menu.
E	**Page**	This is where the content of each page is located
F	**System Clock**	The System Clock shows the current time of the system. If this is incorrect, you will need to change it to ensure correct operation of the Multigrow (see the section titled Admin/Time).

Navigational Sections

Home

The Home section provides a form for logging into the Multigrow controller or shows which user is currently logged in with a **Log out** button. The basic status of the controller is also shown such as:

- Active alerts
- Date
- Time
- Sunrise Time
- Sunset Time

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Readings

The readings section shows live readings for all configured functions of the system. Using the Primary, Secondary and Tertiary menus you can drill down to get the information that you need.

History

The History section uses historical data recorded by the Multigrow to generate graphs and tables to visually represent your systems history.

For more information on how the History works, see the section titled "***History***".

Settings

The Settings section contains options that could change during the growing season, for example, heating and cooling targets.

Configuration

The Configuration sections contains options that should be set once when the system is installed, and stay the same unless something to do with the installation changes, for example, another irrigation system is added.

Alerts

The Alerts section allows you to see any alerts raised by readings going out of limits that you have set. It also shows alerts that have happened in the past, and which may occur in the near future.

For more information on how Alerts work, see the section titled "***Alerts***".

Admin

The Admin section allows you to configure various administrator settings and shutdown or restart the Multigrow.

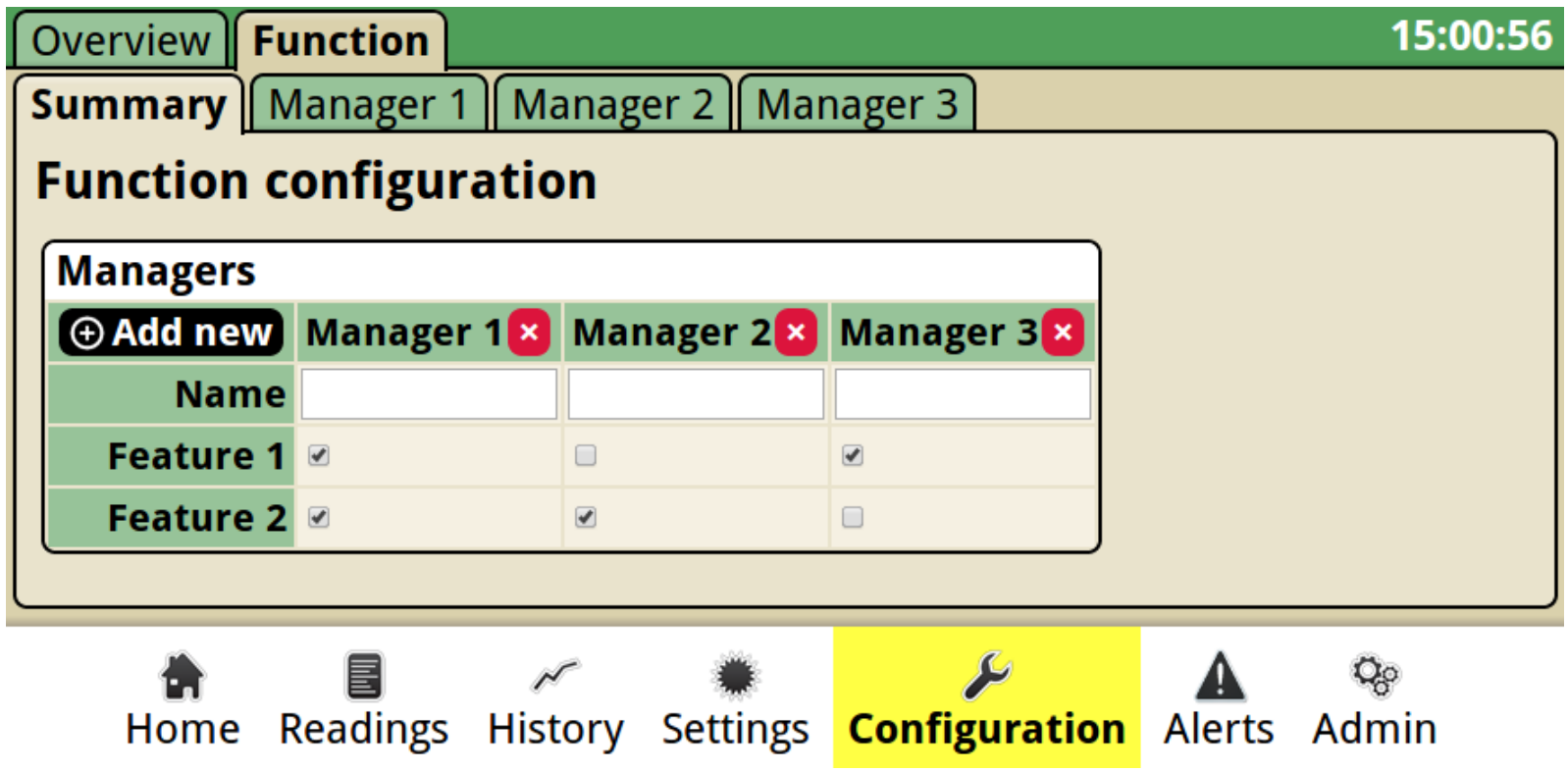
For more information on the Admin section, see the section titled "***Admin***".

Configuration

> We recommend that before configuring any features of your system you first configure each sensor.

Basic User Interface Patterns

This is the basic user interface pattern for configuring a function with managers.



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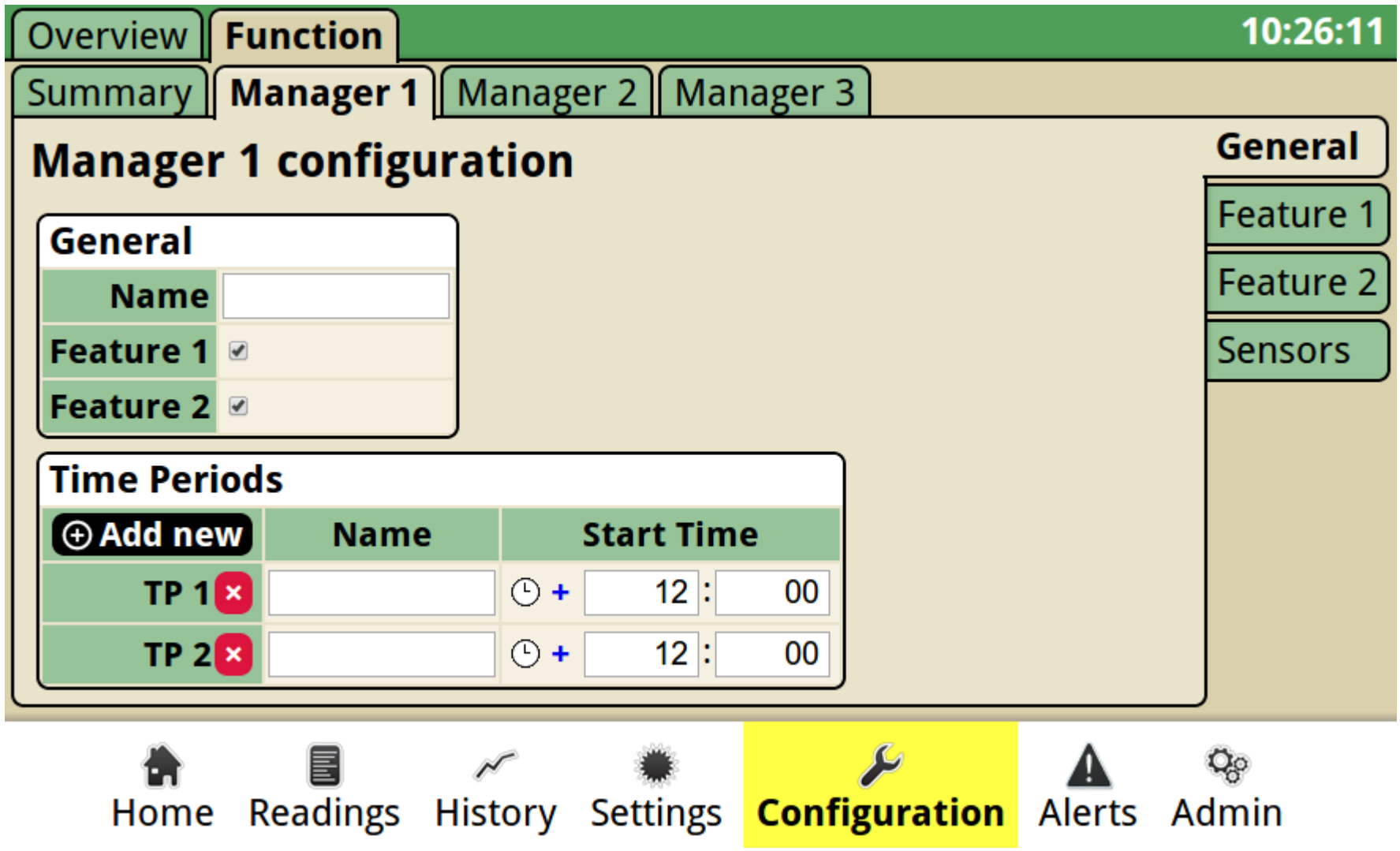
As you can see, three managers have been added to the function using the **Add new** button, with selected features added to each manager by ticking the checkbox corresponding to each.

When you push the **Manager 1** tab in the Secondary Menu to go to the manager configuration page you will see that it has tabs in the Tertiary Menu for each feature enabled.



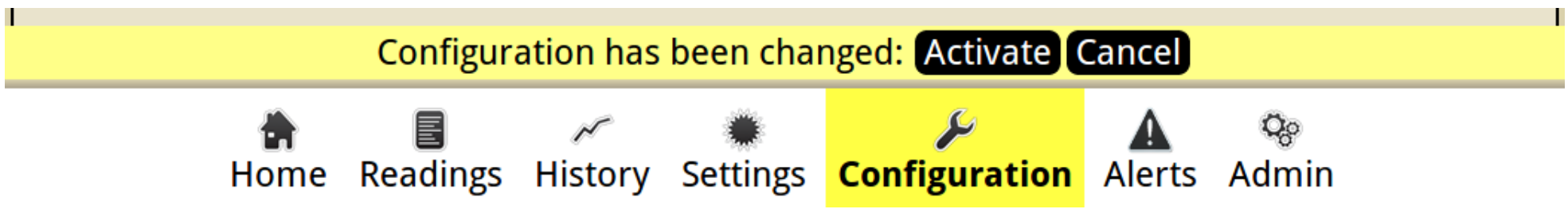
In turn, pushing the tab for **Feature 1** in the Tertiary Menu will take you to the configuration page for that feature.

This pattern is prevalent throughout the Settings and Readings sections as well.

Activating configuration or settings changes

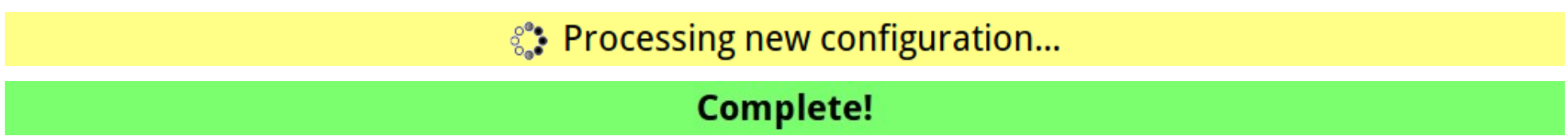
Your Multigrow is always controlling and as such has a *Running Configuration*. This is the configuration that the "control loop" is using to control the system at all times.

When you change settings or configurations it creates an *Editing Configuration*. You will know when you have an *Editing Configuration* because a yellow bar will appear at the bottom of the screen above the Navigation Bar saying **Configuration has been changed** or **Settings have been changed** with both an **Activate** and **Cancel** button.



After changing something in these sections you will notice **Save** and **Cancel** buttons appear at the bottom of the page. Every time you push the **Save** button you add the change(s) to the *Editing Configuration*.

It is not until you push the **Activate** button that the control loop will stop, and the *Editing Configuration* becomes the new *Running Configuration*. During this process the yellow bar will change to say **Processing new configuration** with a loading animation, before changing to a green bar saying **Complete** and disappearing.



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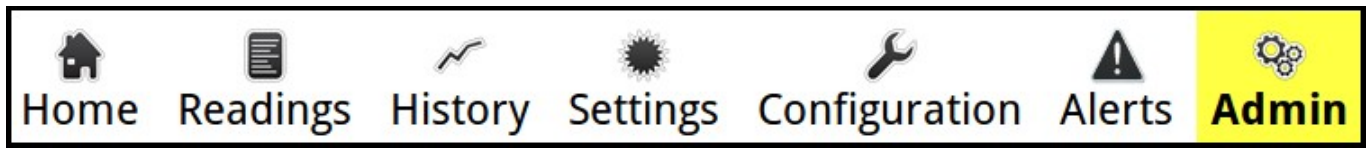
You could also push the **Cancel** to revert any changes that you made.

The reason Configuration and Settings changes are done this way is to stop half-baked configuration being acted on by the control loop, causing unexpected events. For instance the defaults in the system may not suit the environment, so every fan in a greenhouse might start running if the cooling targets haven't been changed, but the fans have been configured.

Admin



The Admin section allows you change administrative settings for your Multigrow.

Access

Administration and passwords

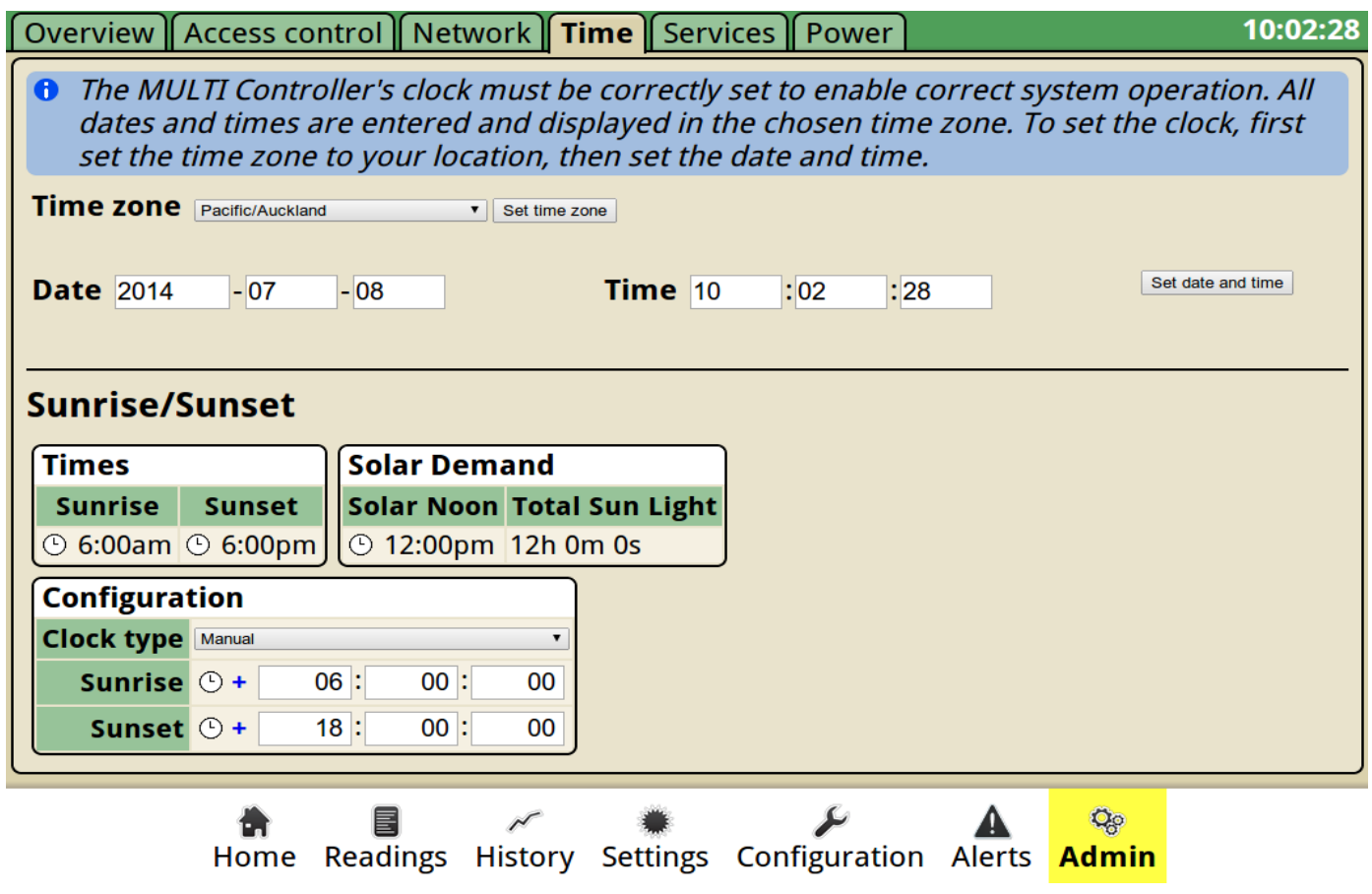
A new Multigrow controller must be enabled for the functions purchased. Distributors enable this by visiting the Autogrow distributor website and loading the functionality. Once the features are loaded, the software blocks purchased will be enabled and will be available in the configuration menu. If the system is to be modified or expanded in the future it is easy to re-enter the web site to obtain an upgraded license with additional functions enabled. If you find that after entering a number of configuration settings that the system will not allow you to enter any more then it is most likely that you have already exceeded the license conditions.

Passwords and Setting classifications

	Password	Settings classifications
L1	Basic	Allows all readings and settings to be viewed only
L2	Grower	Allows everyday settings to be changed
L3	Advanced	Allows the everyday and advanced settings to be changed
L4	Administrator	Allows configuration and access to technical settings

Time

The Multigrow controller needs to have the time and date set correctly in order to enact accurate control. Under the **Time** tab you can set the date, time and timezone as well as the sunrise and sunset times. The latter can be detected automatically by entering the GPS coordinates of the controller.



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Setting the date and time

Setting the date and time is easy. Simply enter the values in the fields provided and press the **Set date and time** button. The values are set in the format: *Year-Month-Day* and *Hours*:*Minutes*:*Seconds* with hours being in 24 hour format.

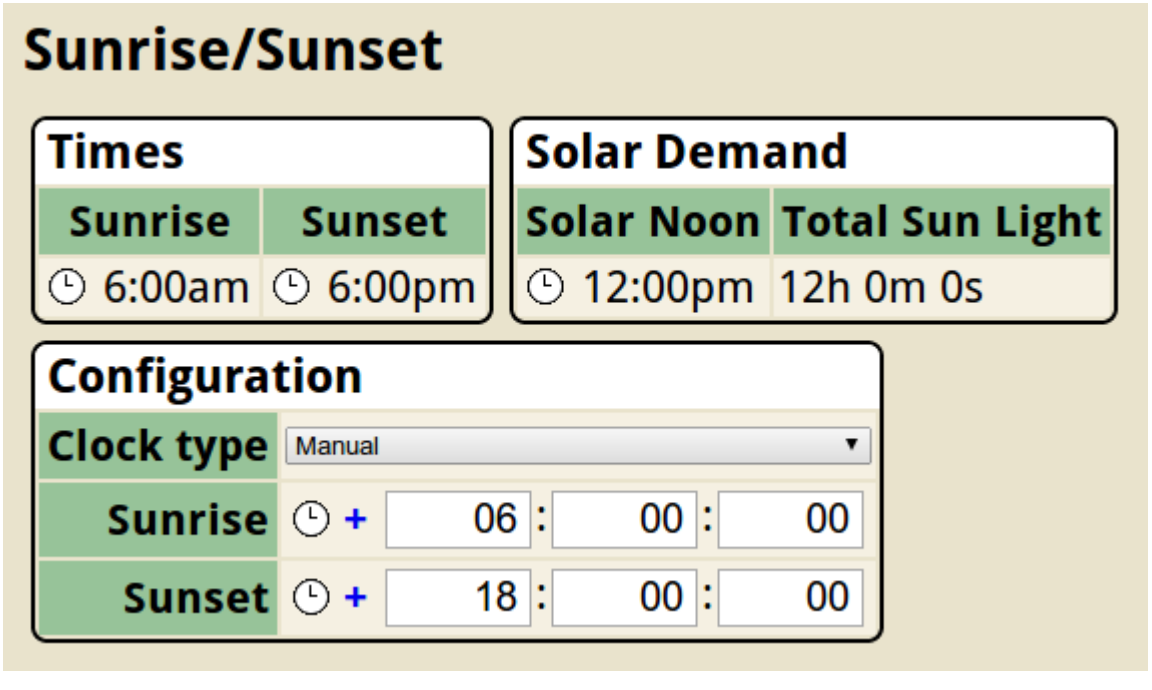
Setting the timezone

Setting the timezone is as simple as choosing your timezone from the dropdown box and pressing the **Set time zone** button.

Setting Sunrise and Sunset times

Manual

To use manual sunrise and sunset times, change the **Clock Type** dropdown box to "*Manual*" and enter the sunrise and sunset times manually.



Astronomical

The date and time must be set to local time. The astronomical clock uses the date, longitude and latitude to determine the time of sunrise and sunset for that location. If the climate time periods are set relative to these times then they will automatically adjust as the seasons change. Similarly, irrigation start and stop times can be set relative to these times.

GPS coordinates can be obtained by a number of methods:

- A dedicated handheld GPS device
- A smartphone app that provides GPS coordinates
- A maps website that provides GPS coordinates

If you only have access to coordinates in the format *degrees, minutes and seconds* (e.g. 38° 42' 4.98", -9° 9' 48.30") there are many websites that can convert these values into *decimal degrees* coordinates (e.g. 38.701383, -9.163417).

To enable the astronomical clock, change the **Clock Type** dropdown box to "*Astronomical*". Then enter the values for Latitude and Longitude in decimal degrees.

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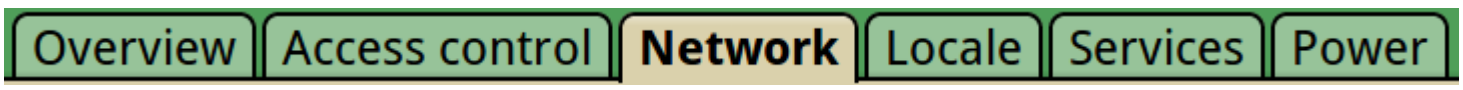
If your environment has the morning or afternoon sun blocked by a mountain, hill or building you can set the **Sunrise Offset** and/or **Sunset Offset**. So for example using the above sunrise time, if a hill near your greenhouse blocks the morning sun until 8am you can set the **Sunrise Offset** to "*00h 25m*". You still get the advantage of using astronomical time, while taking into account local conditions.

Network



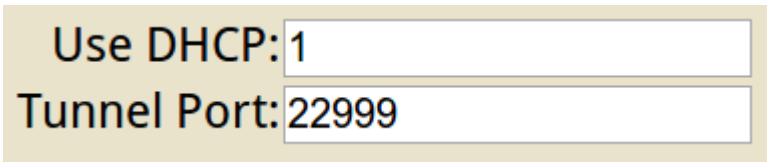
Entering incorrect network settings may cause the Multigrow to become inaccessible over the network. If in doubt, check with your network administrator to determine the correct network settings to use for your Multigrow controller.

The network page allows you to configure how your Multigrow connects to your local area network (LAN). Before continuing, you will need to determine if your network uses automatic addressing (most likely) or static addressing.

Automatic Addressing

What is Automatic Addressing or DHCP?
DHCP is a network addressing protocol present on most store bought routers/modems. It allows your router/modem to automatically assign a network address to any device that connects your network. This means you can plug devices into your network and they will automatically connect without you needing to configure anything (except to tell it to use DHCP).

The following fields are shown when DHCP is enabled:



A description of each follows:

- **Use DHCP:** controls if DHCP should be used
- **Tunnel Port:** the port number for the redundant administrative tunnel

To enable DHCP, enter a "*1*" in the **Use DHCP** field and press enter (push save if it appears as well). Refresh the page by pressing the **Network** tab at the top of the page until an address appears below the **Current IP Address** heading.

It could take up to a minute for the Multigrow to receive an IP Address depending on your physical network setup and what other devices are on the network.

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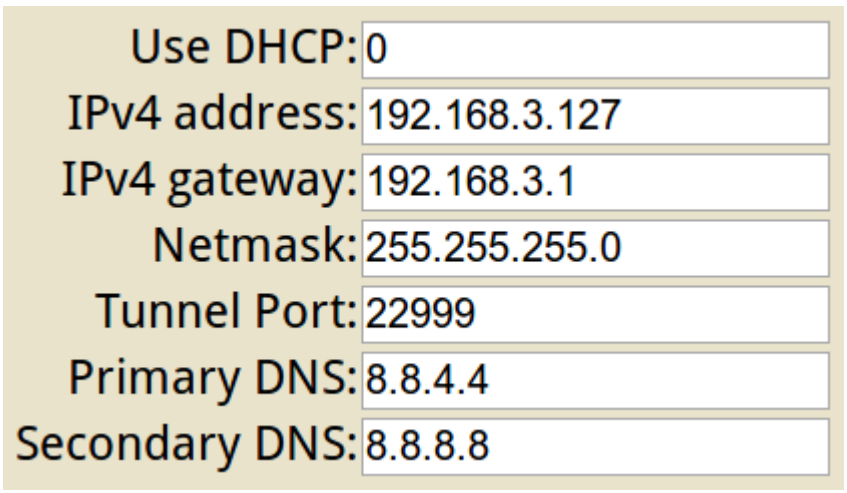
If no address appears, and remains as "*Unknown*", you can force the Multigrow to ask for an address again. Do this by entering "*0*" in the *Use DHCP* field, pressing enter (and save if it appears). Then enter "*1*" in the *Use DHCP* field and push enter and save again.

Static Addressing

If your network does not use automatic addressing you will need to determine the address range for your network. If you don't know these details ask your network administrator or the person who setup your network. You could also try to determine the correct settings by checking the configuration of other devices on your network.

When DHCP is disabled, a lot more fields are available allowing you to manually specify the network configuration of the Multigrow.



A description of each follows:

- **Use DHCP:** controls if DHCP should be used
- **IPv4 address:** the IP address of the Mutligrow with CIDR value
- **IPv4 gateway:** the IP address of the router/modem through which to access the internet
- **Netmask:** the subnet mask of your network
- **Tunnel Port:** the port number for the redundant administrative tunnel
- **Primary DNS:** the domain name server to use
- **Secondary DNS:** the domain name server to use if the primary is unreachable

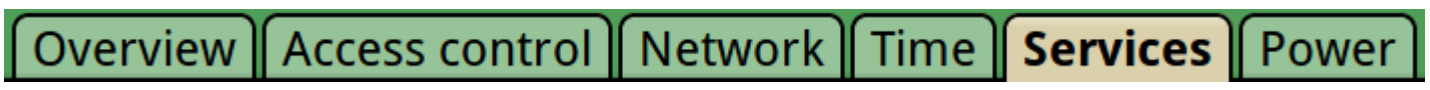
The **IPv4 address** field is the most important. This is the address of your Multigrow on your LAN.

The **IPv4 gateway** field is the second most important. This is the address of your router or modem, and tells your Multigrow how to get to the internet.

The **Netmask** should be left as default unless your network administrator says otherwise.

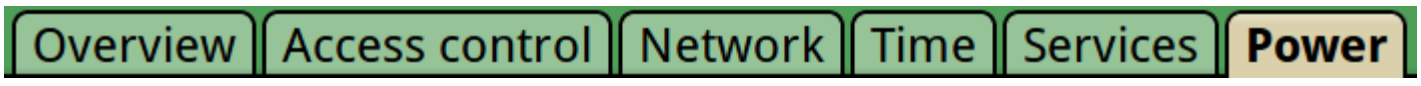
The domain name servers specified as defaults are global public servers provided by Google that are not expected to change in the foreseeable future. If you want you can enter your own ISPs DNS servers here.

Services



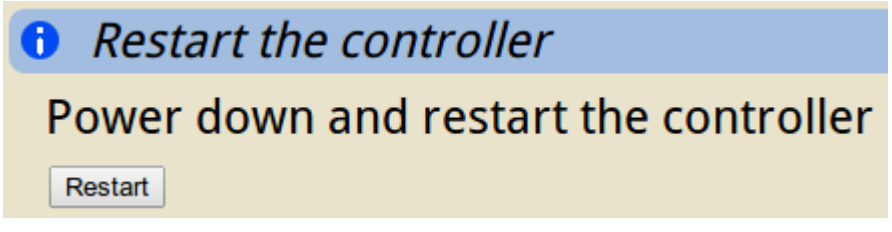
The services page allows you to restart controller services. The buttons on this page should only be used at the direction of Autogrow Systems technicians.

Power



The power tab allows you to shutdown or restart your Multigrow controller.

Restarting



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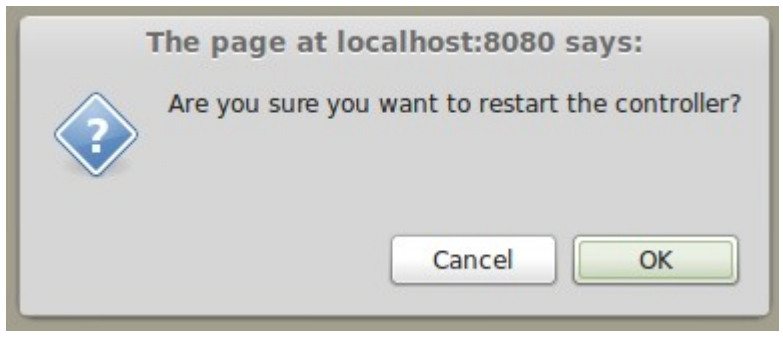
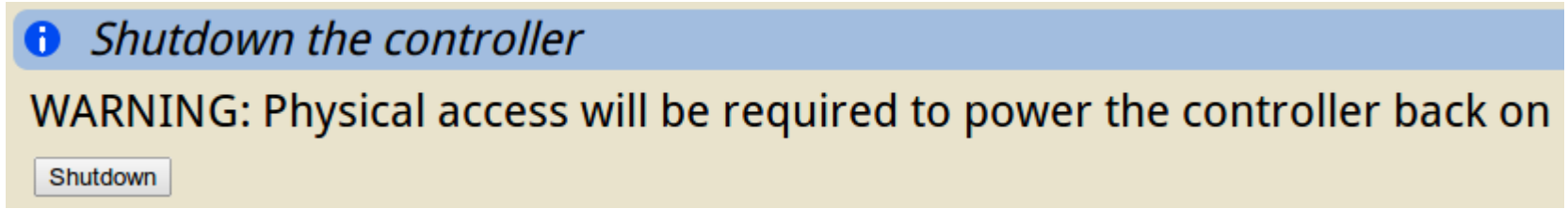
You can restart your Multigrow controller by pressing the **Restart** button. You will be prompted to confirm that you want to restart.



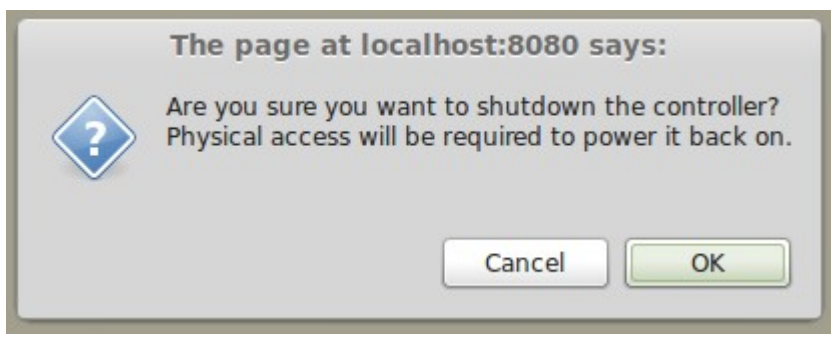
Press **OK** to restart the controller.

Shutdown

When you shutdown the Multigrow physical access will be required to power it back on.



You can turn the Multigrow off by pressing the **Shutdown** button. You will be prompted to confirm that you want to shutdown.

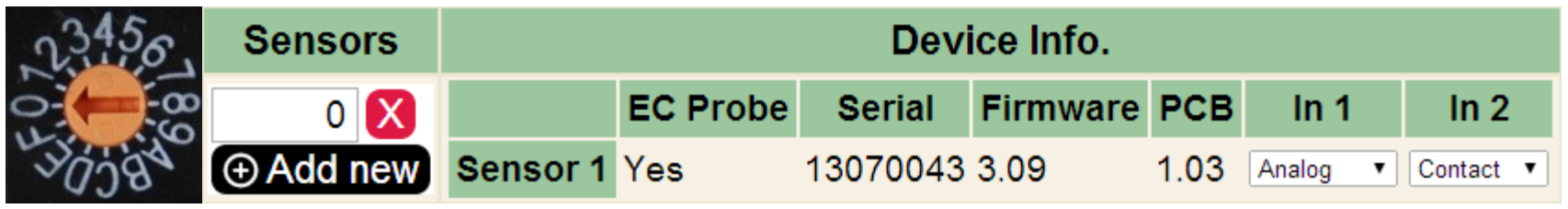

The page at localhost:8080 says:
Are you sure you want to shutdown the controller?
Physical access will be required to power it back on.
Cancel
OK

Press **OK** to shutdown the controller.

The configuration section allows you to configure the Multigrow to talk to to all the equipment that it needs to control. This is done with simple addressing.

Sensor Devices

Sensor Device addresses are a single digit referring to the address set in the rotary switch on the sensor device and can be adjusted using a small screwdriver. See how the address on the rotary switch matches the address in the text box below:



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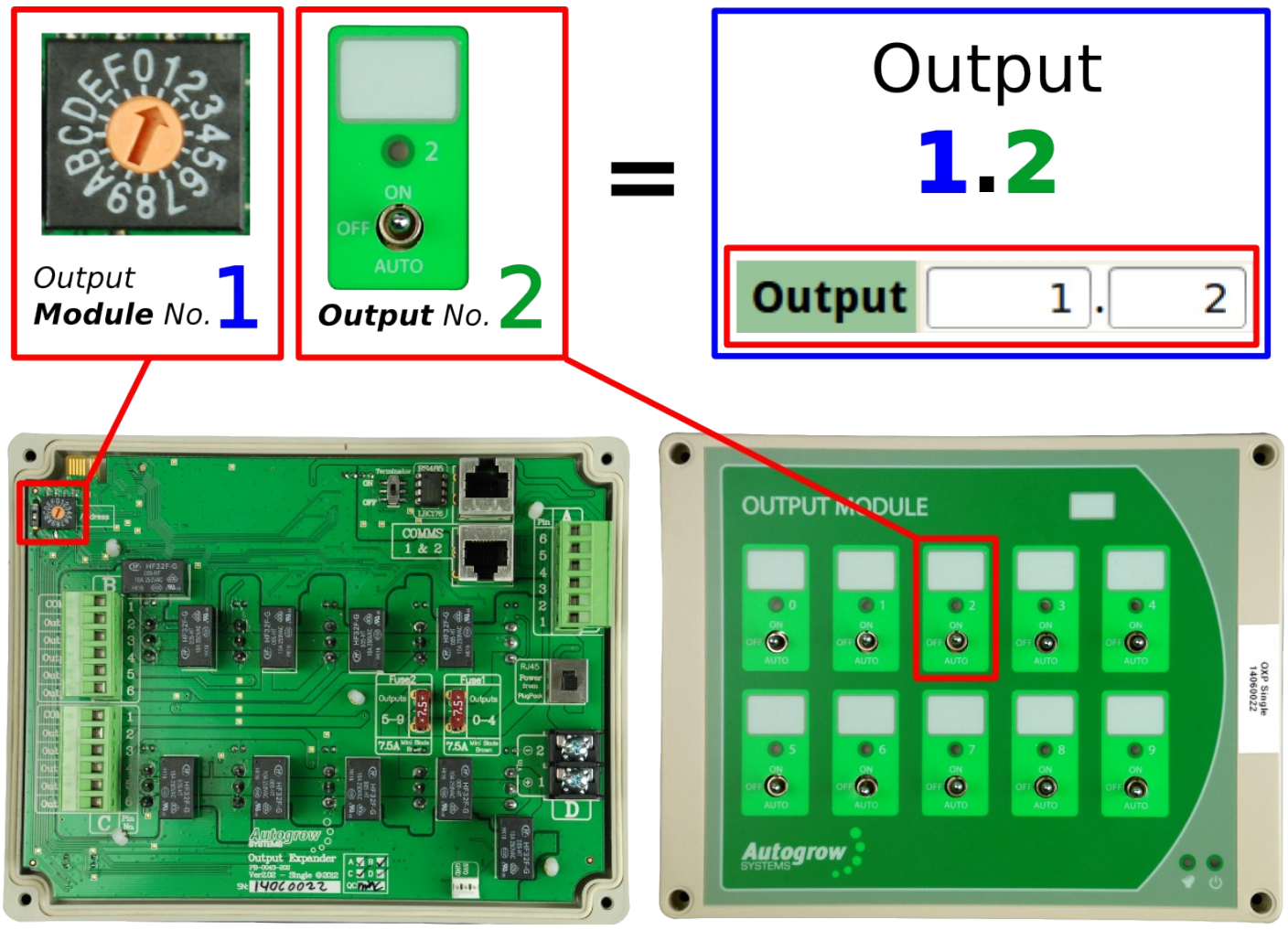
Output Modules

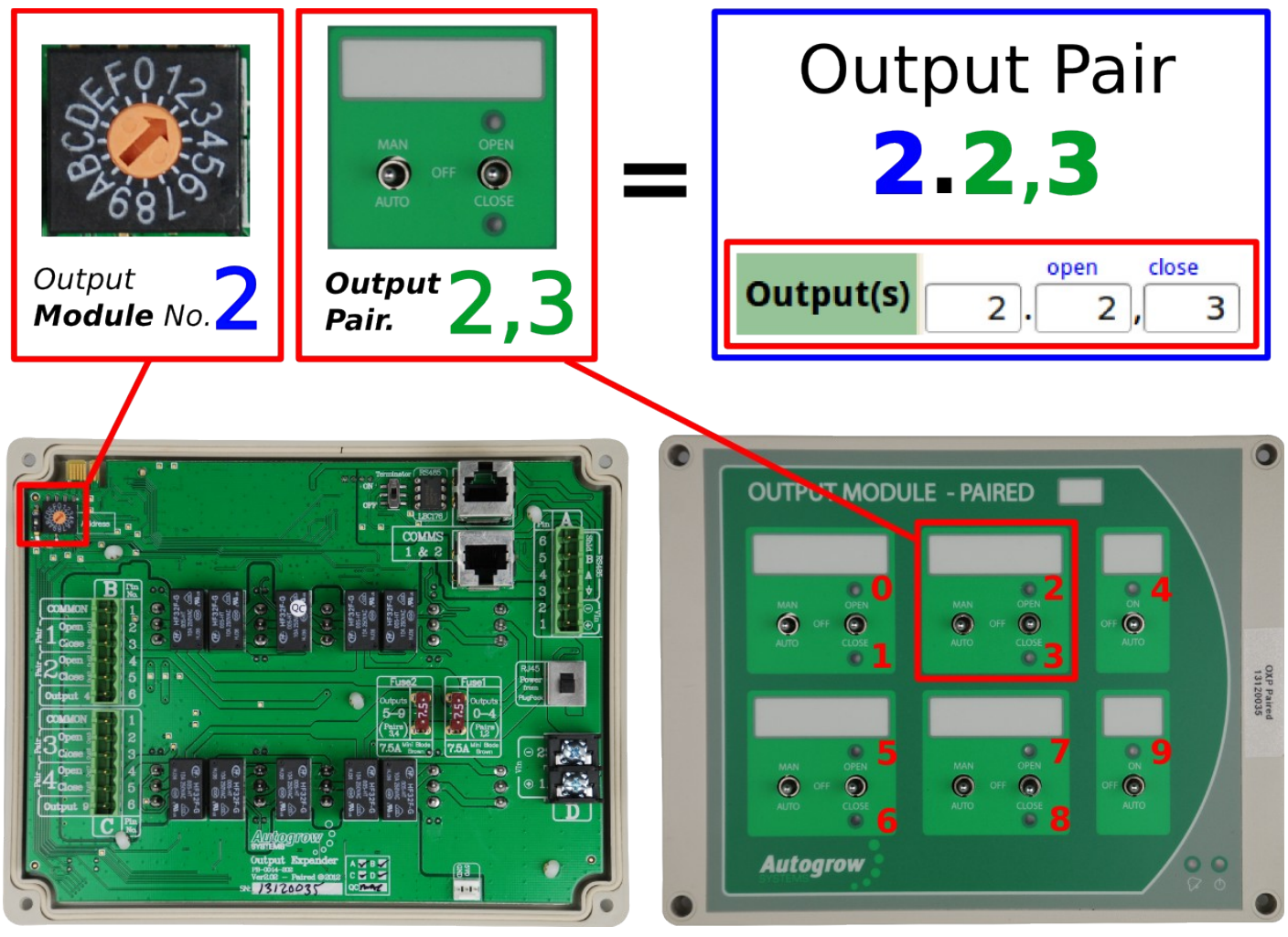
Single

For Single Output Modules the addressing is specified with the address of the module itself, followed by a period and then the number of the output:



Paired

For Paired Output Modules the addressing is specified with the address of the module itself as before, followed by a period then the number of the open output, followed by a comma and then the number of the close output:



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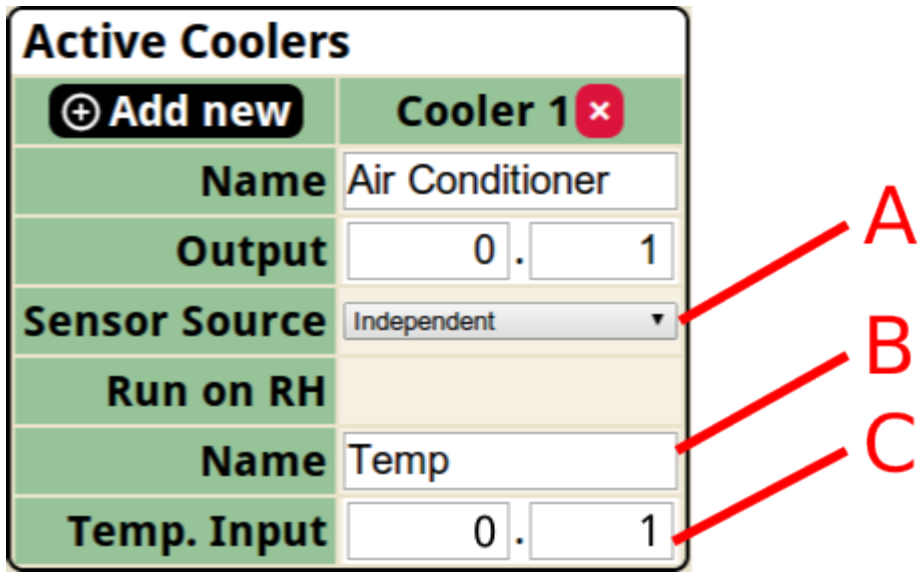
Independent Sensors

Many features in the system have the ability to use independent sensors over the ones configured in the manager. Independent Sensors connect to the Single Output Modules so use the same addressing scheme. Using a climate cooler as an example this is how you would configure an independent sensor:



Annotation	Name	Description
A	**Sensor Source**	Changing this dropdown to "*Independent Sensor*" will enable **B** and **C** (after the **Save** button has been pushed)
B	**Name**	Arbitrary name for your Independent Sensor
C	**Temp. Input**	Output address for your Independent Sensor

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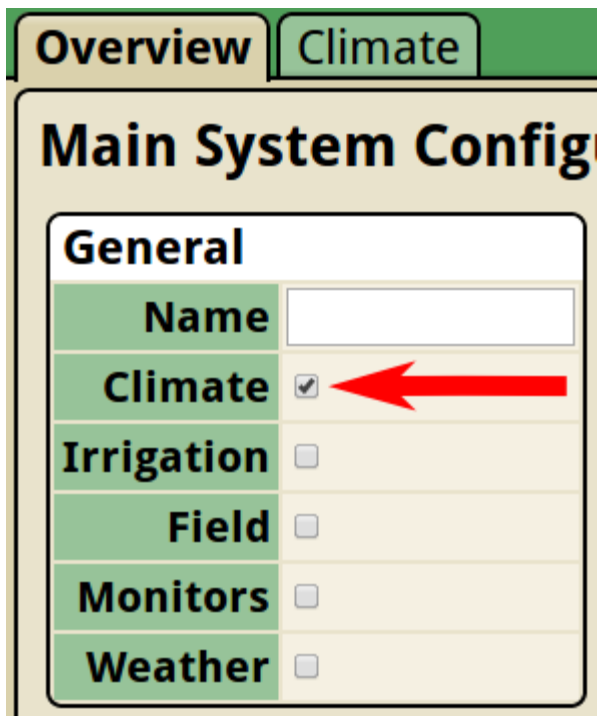
Climate

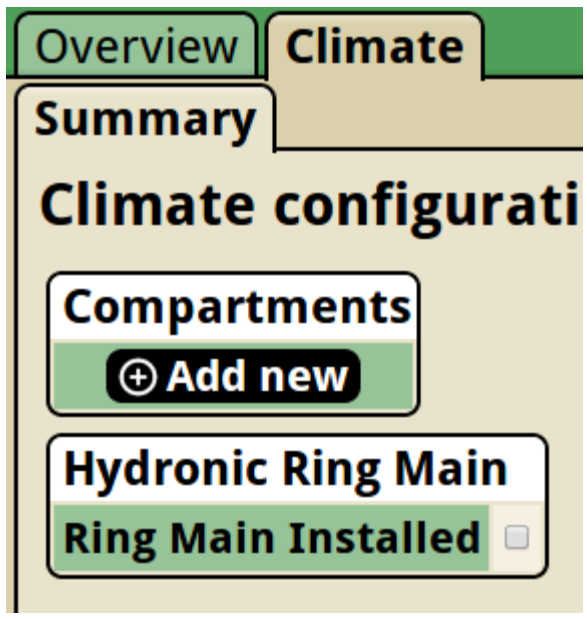
The Multigrow can use many different types of equipment to control the environment and ensure all targets are met.

Adding a new Compartment Manager

To add a new compartment manager go to **Configuration > Overview** and tick the checkbox labelled **Climate**.



Pressing the **Save** button that appears will refresh the page and a tab named **Climate** will appear in the Primary Menu. Pressing on that **Climate** tab will take you to the (blank) climate configuration page:



Pressing the **Add new** button will cause a new compartment to be added and allow you to select which equipment is installed in that compartment by ticking the appropriate checkboxes.

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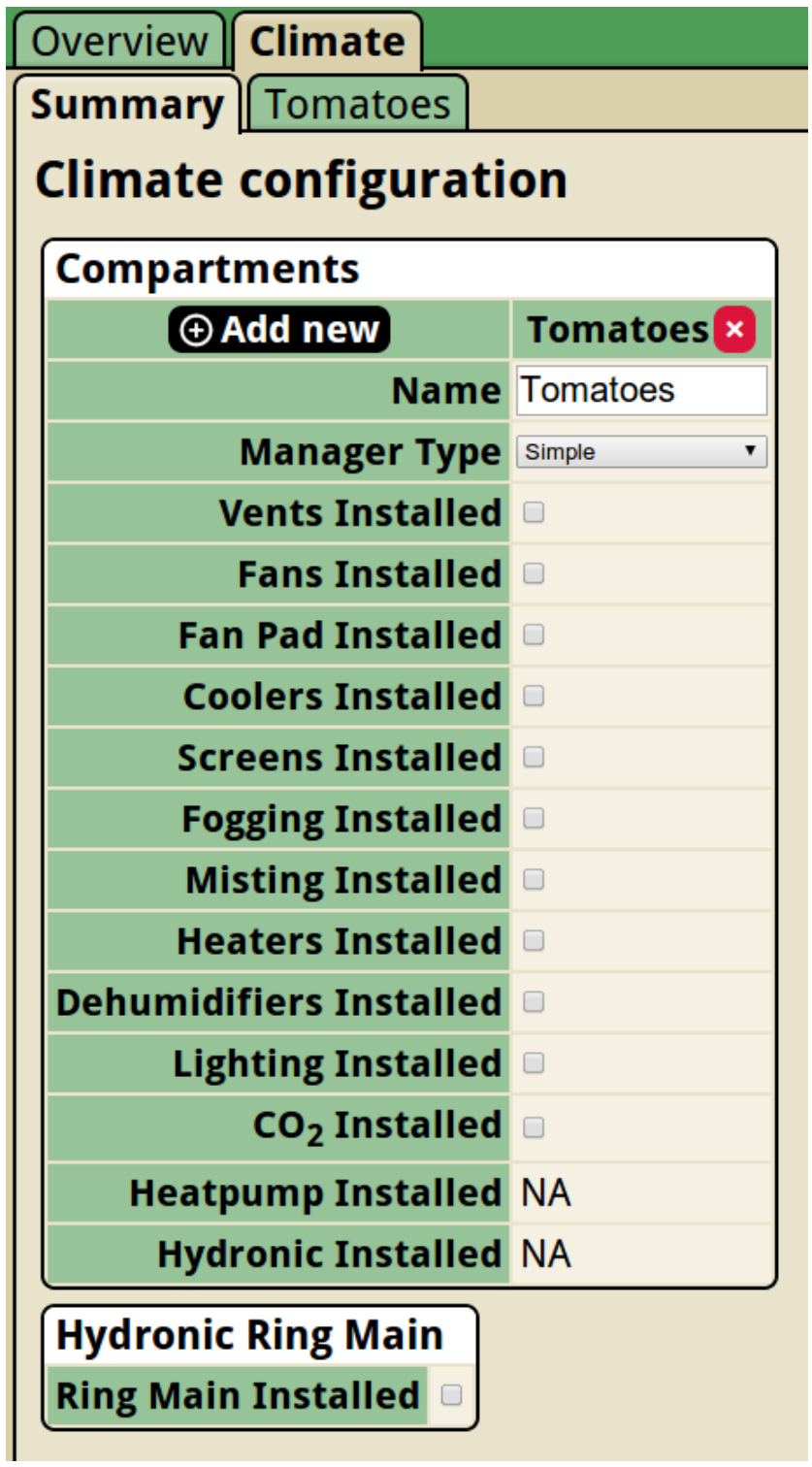
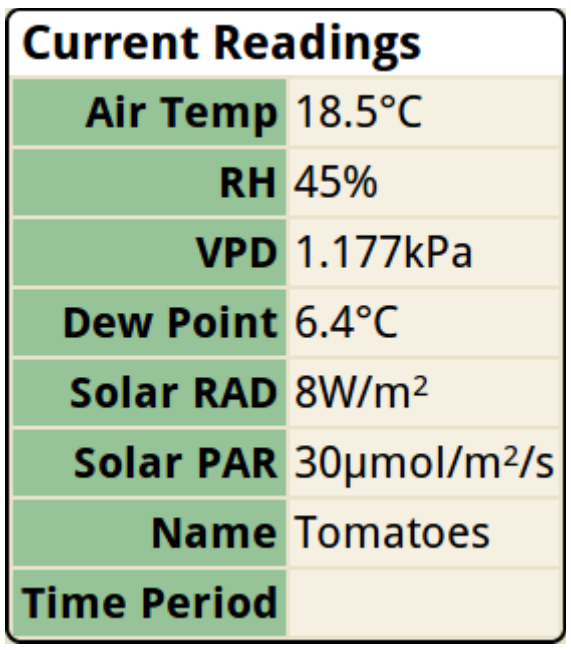


Setting up a new Compartment

Once your new compartment is configured, navigate to **Settings > Climate > Tomatoes > General** to setup some of the general compartment control options.

Current Readings

This section just shows the current readings that the sensor is reporting to aid you in setting the set points.



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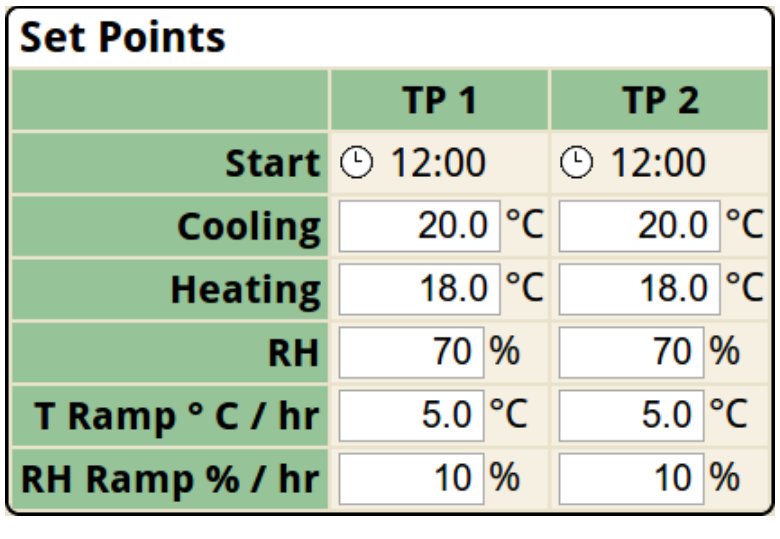
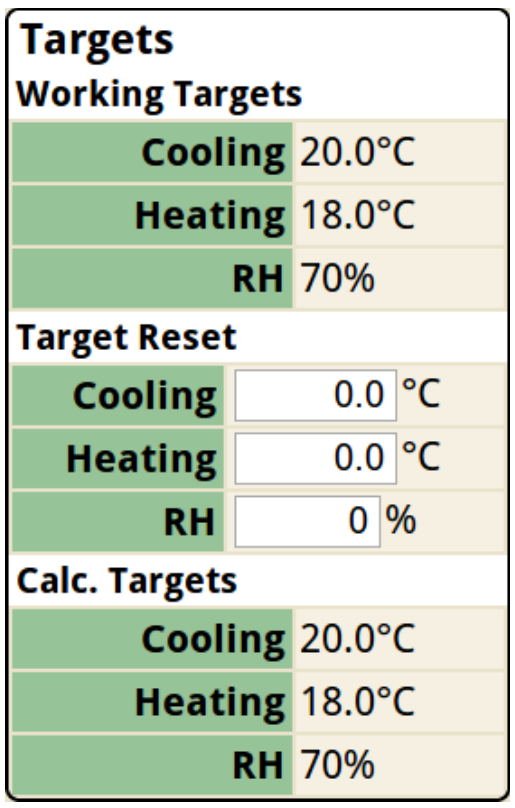
Set Points

The set points table contains the ideal readings that you want to keep the compartment at. They can be set per time period so you could have different set points for night and day for example.



Field	Description
Start	The time period start time
Cooling	Start cooling the compartment if the temperature goes above this
Heating	Start heating the compartment if the temperature goes below this
RH	Humidify if the RH goes below this, dehumidify if the RH goes above this
T Ramp °C / hr	To avoid shocking the plants, transition the **Working Targets** to the **Calc Targets** by this rate
RH Ramp % / hr	To avoid shocking the plants, transition the **Working Targets** to the **Calc Targets** by this rate

Targets



Working Targets shows the current targets that the system is enforcing. The **Calc[ulated] Targets** shows the current targets that the controller should be enforcing for the current time period and influences (if it's a smart compartment). If there is a difference between the Working and Calculated targets, then the **Working Targets** will be transitioning to the **Calc Targets** at the ramp rate specified for the current time period.

The **Target Reset** fields allow you to change the **Working Targets** immediately to an arbitrary value you specify. The target will immediately change to that value, but it is not permanent. It will start tracking back to the target specified for that time period at the specified ramp rate. This means that the Multigrow will immediately use the configured equipment to meet the target even if that would shock the plants.

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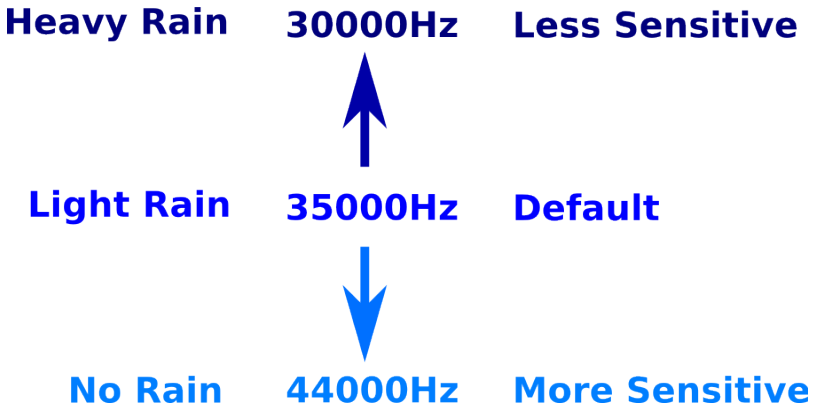
Technical

Technical	
Rain Freq.	45864 Hz
Rain Trip Frequency	35000 Hz

This allows you to set the compartments rain sensitivity. The **Rain Freq.** field is the reading coming back from the weather station. The **Rain Trip Frequency** sets how sensitive the rain detection is. Rain detection can be used to control the vents and the screens and the vents. For instance some flowers are very sensitive to rain drops on the petals so setting the rain detection to be more sensitive will cause the vents or screens to close to keep rain off the crop. For hardier crops you may not need to worry so could set the sensitivity to be lower.

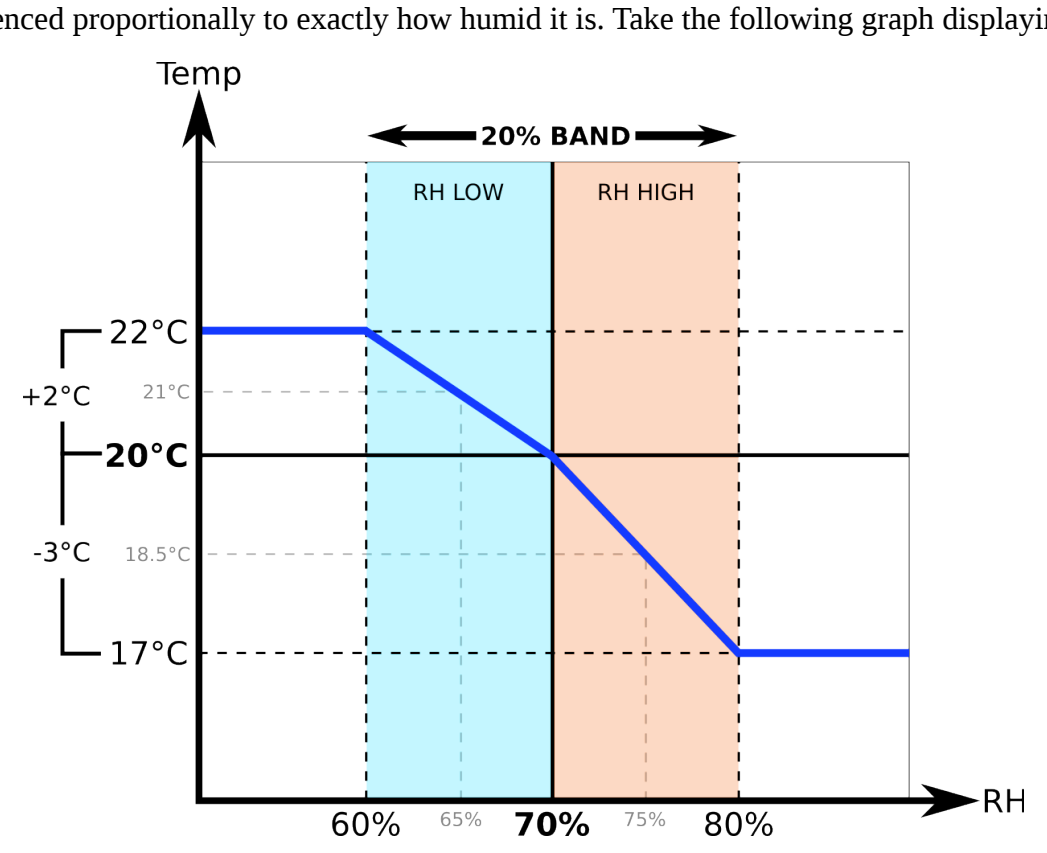


Influences

When the compartment is configured as a smart compartment you will also have the ability to set humidity and solar influences on the targets.

Influences				
RH Prop Band	20 %			
RH High	Start	End	Cool	Heat
	70%	80%	-3.0 °C	2.0 °C
RH Low	Start	End	Cool	Heat
	70%	60%	2.0 °C	-1.0 °C
Solar	Start	End	Cool	Heat
	300 W/m^2	700 W/m^2	-3.0 °C	-3.0 °C

The cooling and heating targets can be adjusted when the RH is high or when it is low. The **RH Prop[ortional] band** setting will allow the target to be influenced proportionally to exactly how humid it is. Take the following graph displaying the RH influence on the cooling target:



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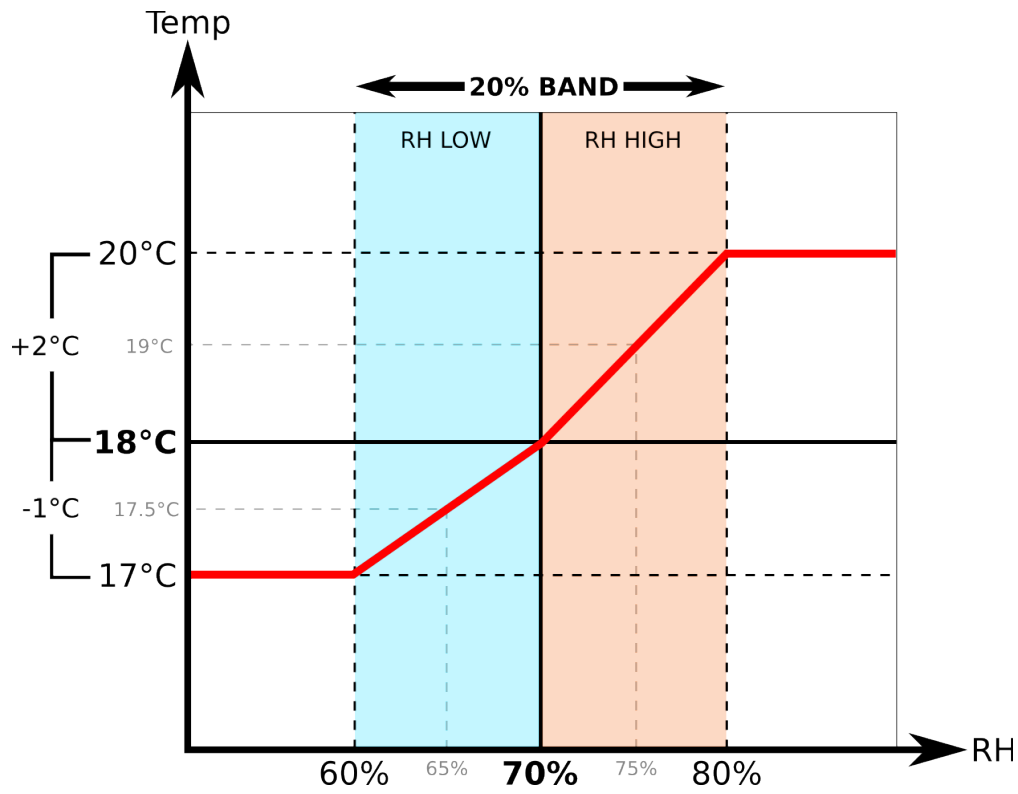
You can see cooling and RH targets in bold with black lines. When the RH is between 0% and 60%, the cooling target is increased to 22°C so that the vents won't open as early, thus raising the RH inside the compartment. This value is obtained by adding the **RH Low Cool** value to the default cooling target from the set points. You can see how the target is adjusted proportionally to the RH, as it is 21°C when the RH is at 65%. When the RH is on target (70%), the cooling target will match the default cooling target value in the set points (20°C).

Once the RH goes above the target, the **RH High Cool** value (usually negative) will be proportionally added to the default cooling target to decrease the cooling target as the RH gets higher. In this setup, once the RH hits 80% the cooling target will be 17°C. The result gained is that the vents open sooner to try to bring the RH down.

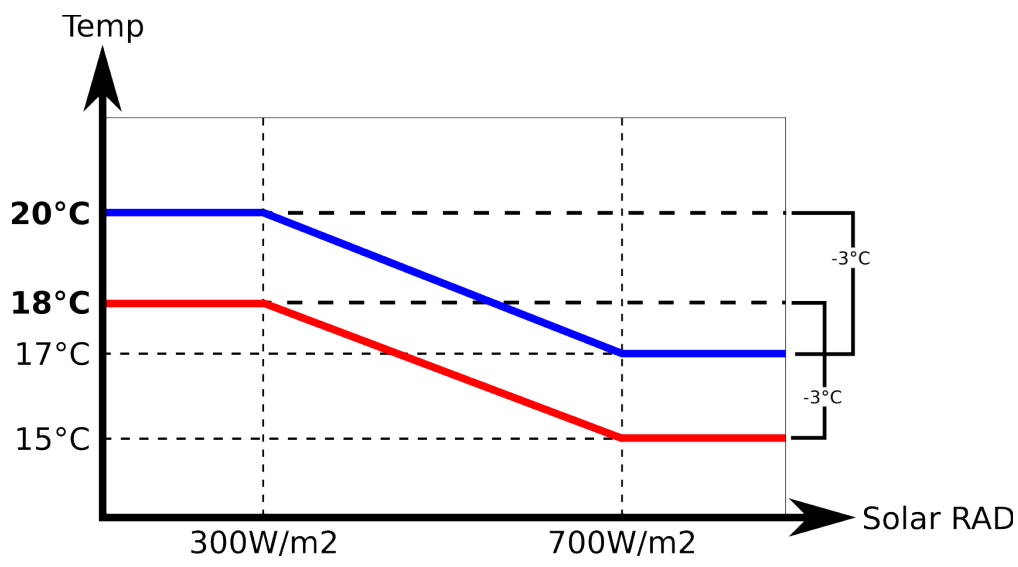
A similar effect is achieved by altering the heating target. Consider the following graph:



As you can see, when the RH is low the heating target is decreased by the **RH Low Heat** value so the heaters will turn on later. It is adjusted proportionally to the RH using the **RH Prop[ortional] Band** once the RH gets above 60%. Again the heating target will be the default when the RH is it's target 70%. When the RH gets above 60% the heating target is raised proportionally until it gets to 20°C (the default heating target + **RH High Heat**).

This has the effect that all the hot wet air is driven to the top of the compartment by convection, and if the vents are open it is pushed out of the compartment. If the vents are not open then the purging rules enforced by the Purge Manager will come into play to purge the wet air and bring drier, colder air in. Even if the colder air that comes in is wet, the action of heating it up will dry it out.

So the **RH High** and **RH Low** influences keep the temperature and humidity at an equilibrium by adjusting the cooling and/or heating targets. But there is another influence that can adjust those temperature targets; solar.



The solar influence adjusts the cooling target, heating target or both, proportionally to the amount of sunlight coming into the compartment. In the current configuration when the Solar RAD reading is less than 300W/m^2 (as set in **Solar Start**) the cooling and heating targets are not adjusted. Up to 700W/m^2 (as set in **Solar End**) the cooling and heating targets will be proportionally decreased until they hit 17°C and 15°C respectively.

The reason both targets are decreased is to stop the heaters turning on (there is already heat coming from the sun) and allow the coolers to turn on earlier (to get rid of extra unneeded heat from the sun).

The influences on a smart compartment allow the Multigrow to automatically adjust the heating and cooling targets depending on the RH and solar readings to predict and preempt heating or cooling demand. Thus saving energy and keeping the environment more consistent.

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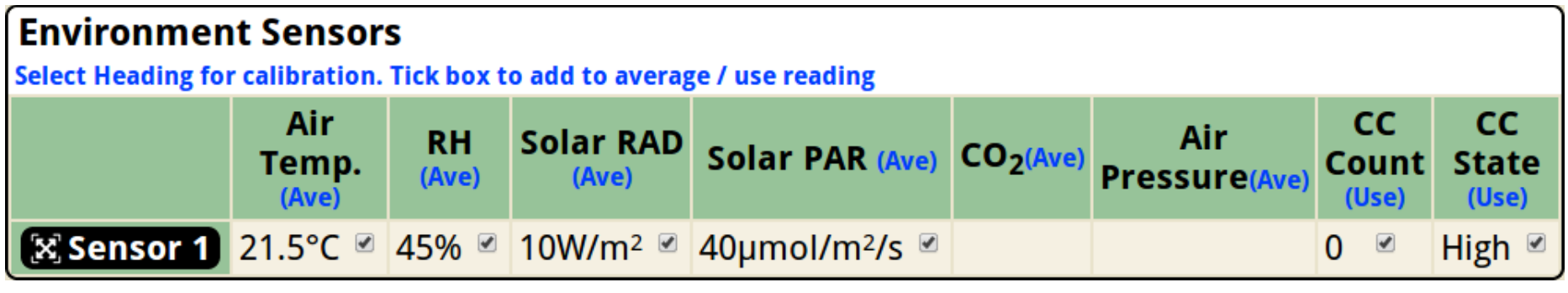
Sensors

By navigating to **Settings > Climate > Tomatoes > Sensors** you can change some sensor settings.



Average Variables

Some or all of the above values are Average Vars.

The addition of the above text and tick box means a variable is part of an averaged set. If the tick box is ticked this means the current reading and all other tick ones will be averaged together. This is useful in order to gain on overall sample of a particular reading. Any invalid readings (e.g. *XX°C*) are omitted from the average even if the box is ticked.

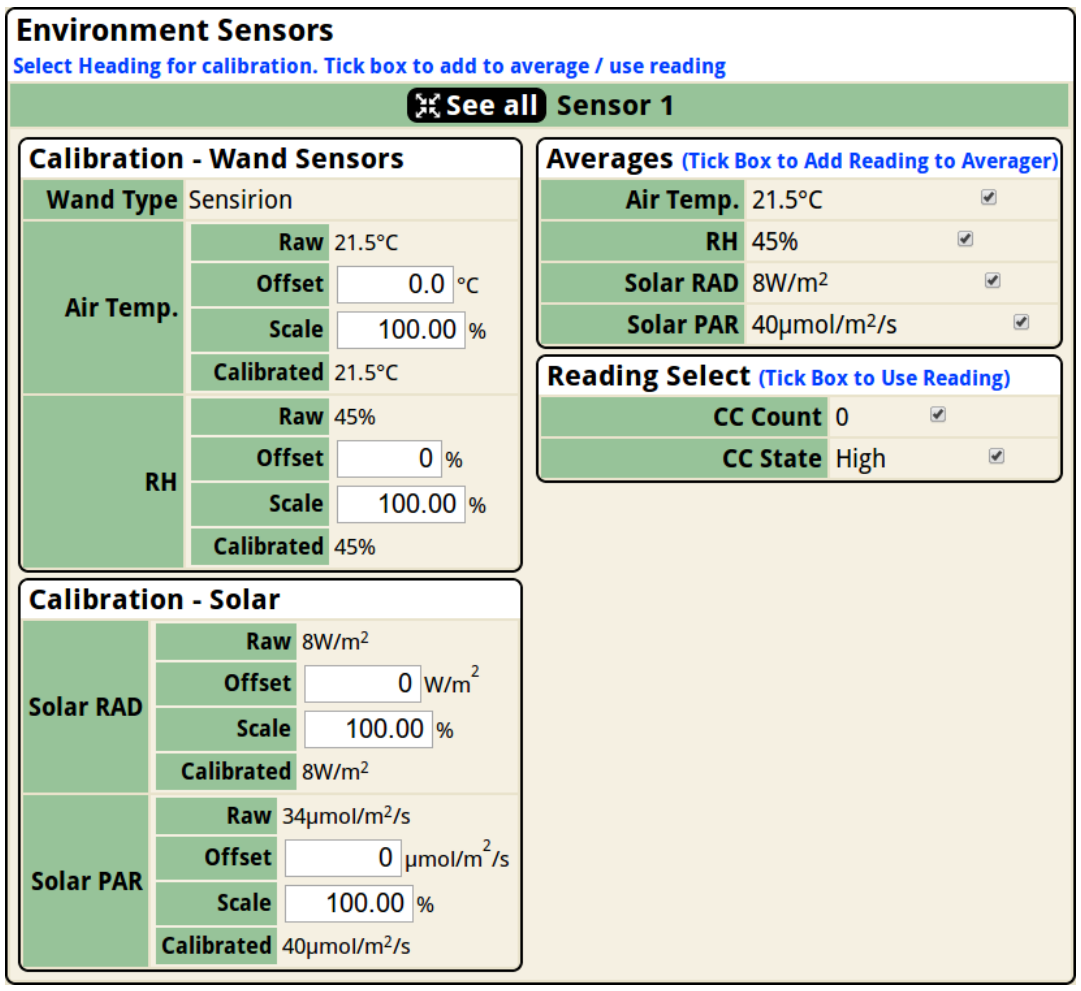
Use Me Variables

Some or all of the above values are Use Me Vars.

The addition of the above text and tick box means a variable is part of an use me set. If the tick box is ticked this means the current reading will be used as the main reading from the group of sensors. This is useful when multiple sensors within a single group are installed but only one is used for the specific reading. If multiple of the same use me vars are ticked, the system will use the value from the lowest sensor number as the reading (e.g. *Sensor 0 RH* will be used over *Sensor 1 RH*).

Extended settings

Pressing the expander button for the sensor gives you some options for advanced calibration, and the same checkboxes for the Use Me and Average variables. You shouldn't need to change the calibration offset and scales because they are normally quite accurate.



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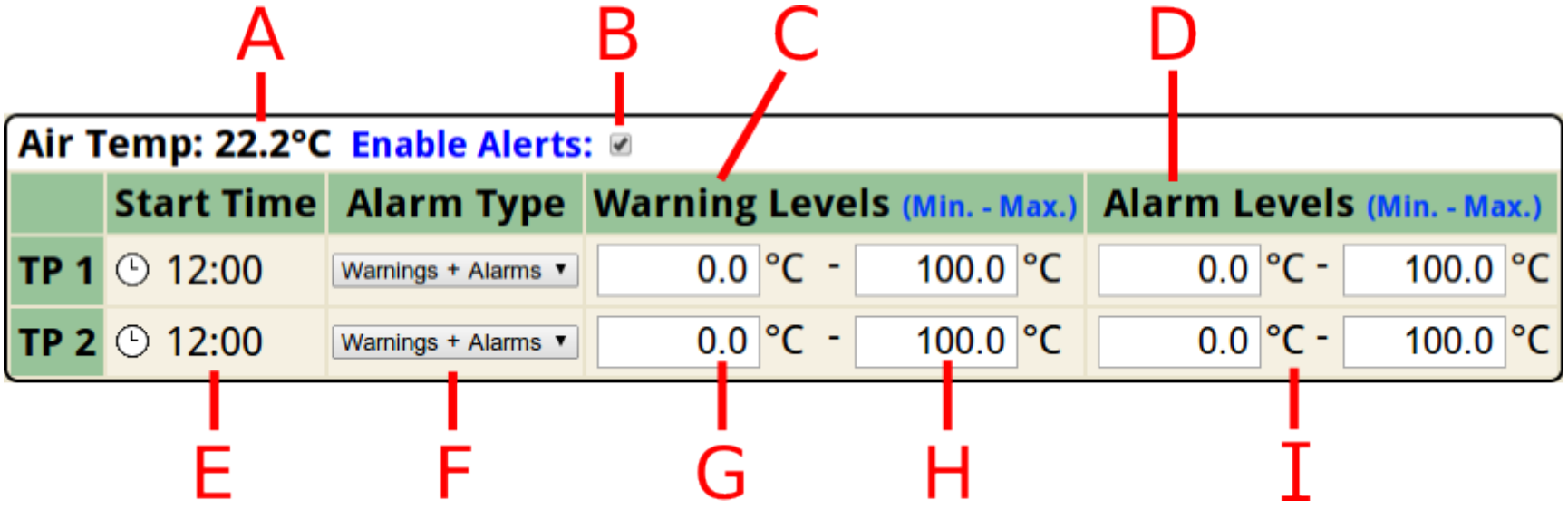
Alerts

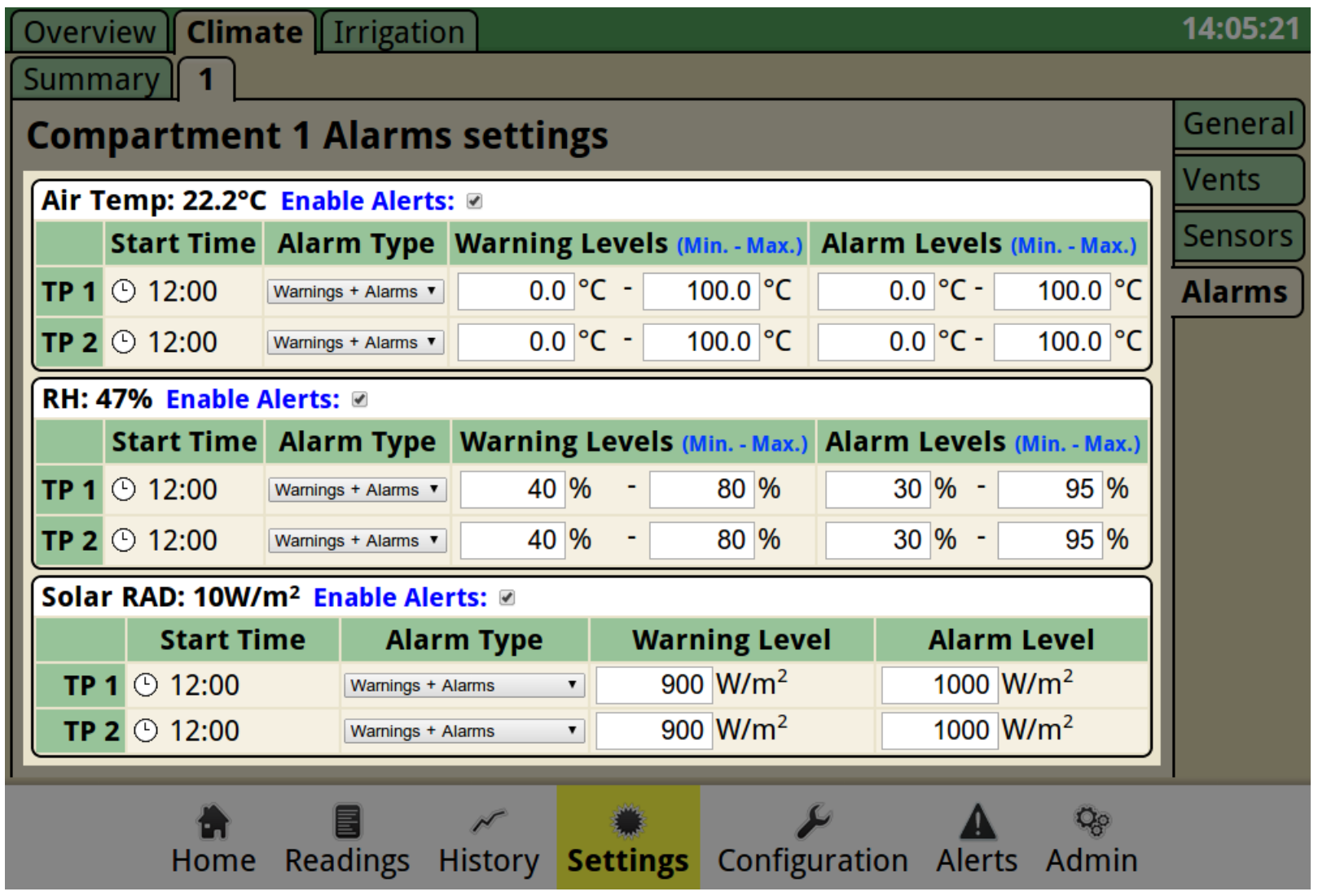
By navigating to **Settings > Climate > Tomatoes > Alerts** you can setup the alerting options.

You can set alert limits for various readings in the system for both Alarms and Warnings under the Settings section by clicking on the Alerts tab.



Annotation	Name	Description
A	**Current Reading**	The current reading for the reading you wish to set an alert limit for
B	**Enable Checkbox**	If ticked, enables alerts for this reading
C	**Warning Levels**	This column shows limits that will raise Warning alerts
D	**Alarm Levels**	This column shows limits that will raise Alarm alerts
E	**Time Period**	The time period for which the limits are valid for
F	**Alert Type**	Per time period alert types, allows you to disable Warnings or Alarms or all alerts for the rows time period
G	**Min Limit**	The minimum value for a reading before an alert is raised
H	**Max Limit**	The maximum value for a reading before an alert is raised
I	**Unit**	The unit that the limit is measured in

For Climate you can set limits for Air Temperature, Relative Humidity and Solar Radiation per compartment:


Overview
Climate
Irrigation
14:05:21
Summary
1
Compartment 1 Alarms settings
General
Vents
Sensors
Alarms
Air Temp: 22.2°C Enable Alerts:
Start Time
Alarm Type
Warning Levels (Min. - Max.)
Alarm Levels (Min. - Max.)
TP 1 12:00 Warnings + Alarms 0.0 °C - 100.0 °C 0.0 °C - 100.0 °C
TP 2 12:00 Warnings + Alarms 0.0 °C - 100.0 °C 0.0 °C - 100.0 °C
RH: 47% Enable Alerts:
Start Time
Alarm Type
Warning Levels (Min. - Max.)
Alarm Levels (Min. - Max.)
TP 1 12:00 Warnings + Alarms 40 % - 80 % 30 % - 95 %
TP 2 12:00 Warnings + Alarms 40 % - 80 % 30 % - 95 %
Solar RAD: 10W/m² Enable Alerts:
Start Time
Alarm Type
Warning Level
Alarm Level
TP 1 12:00 Warnings + Alarms 900 W/m² 1000 W/m²
TP 2 12:00 Warnings + Alarms 900 W/m² 1000 W/m²
Home
Readings
History
Settings
Configuration
Alerts
Admin

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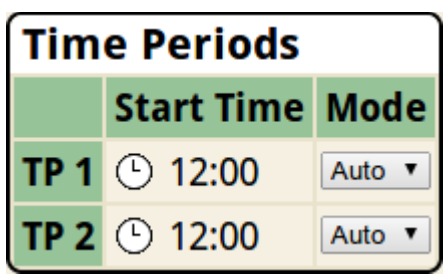
Common Concepts

Time Period Modes

With most equipment it is possible to override the mode in the settings depending on what the current time period.

Whenever you see this box:



You will have the ability to override the time period mode to one of:

- **On:** the equipment will always be on during this time period
- **Off:** the equipment will always be off during this time period
- **Auto:** the Multigrow will decide when to turn the equipment on and off inside this time period

How Offsets Work

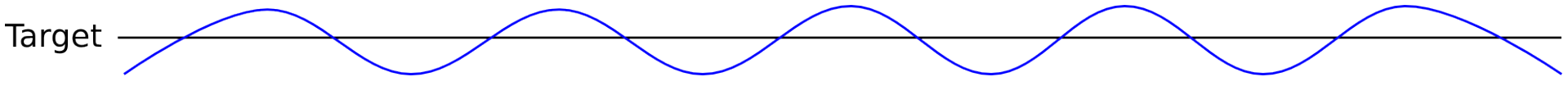
Offsets allow you to change the target that a configured piece of equipment should try to reach above or below that of the compartment target. In this way you can setup graduated staged targets.

For instance, say the compartment temperature target is 20°C and you have two cooling fans configured. You could set the offset for the first fan to 2°C and the offset for the second fan to 4°C. When the temperature inside the compartment reaches 22°C the first fan will turn on. If it fails to cool the compartment and the temperature reaches 24°C the second fan will turn on.

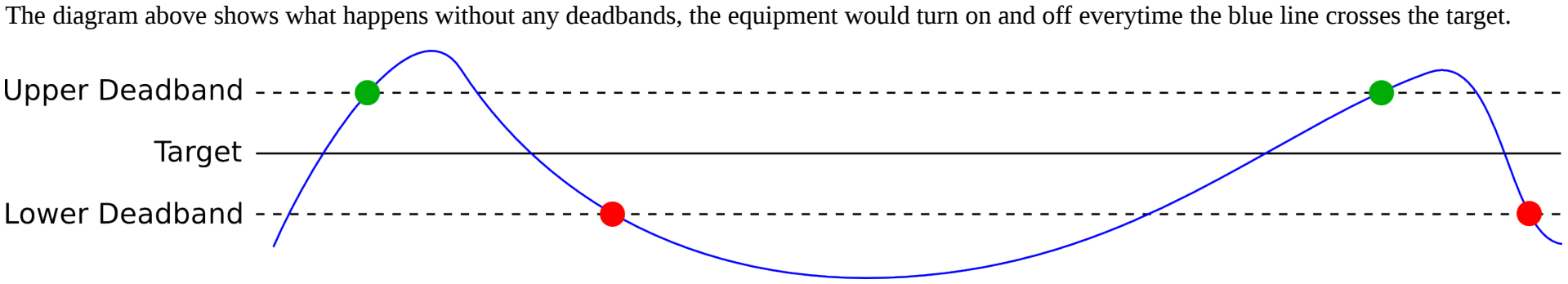
This also works across different types of configured equipment. So you could add a fan pad and wet wall with a 6°C offset so that if both fans fail to cool the compartment and it reaches 26°C the fan pad will turn on.

How Deadbands Work

The Multigrow allows setting deadbands on most configured equipment in the Settings section. Deadbands are used to prevent equipment turning off and on too often which can be damaging to the equipment.



The diagram above shows what happens without any deadbands, the equipment would turn on and off everytime the blue line crosses the target.



However, as in the diagram above, the equipment only turns on at the green dots, and turns off at the red dots for the same amount of elapsed time. The deadbands allow the effect (such as cooling) to happen for longer so that a greater influence is felt keeping the line below the target for longer before the equipment needs to be powered up again. Note that some equipment will operate inversely, turning on at the red dots, and off at the green dots.

Cooling Manager

When enabled, the Cooling Manager will automatically choose between using vents (passive cooling) and fans (active cooling) depending on the cooling needs to ensure efficient power use. For instance, vents may only be used in the morning and late afternoon with fans turning on during the heat of the day for more active cooling.

Cooling Managers are enabled per compartment manager. To enable it you will need to go to **Configuration > Climate > Tomatoes > General**, tick the box labelled **Cooling Manager** and push the **Save** button that appears.

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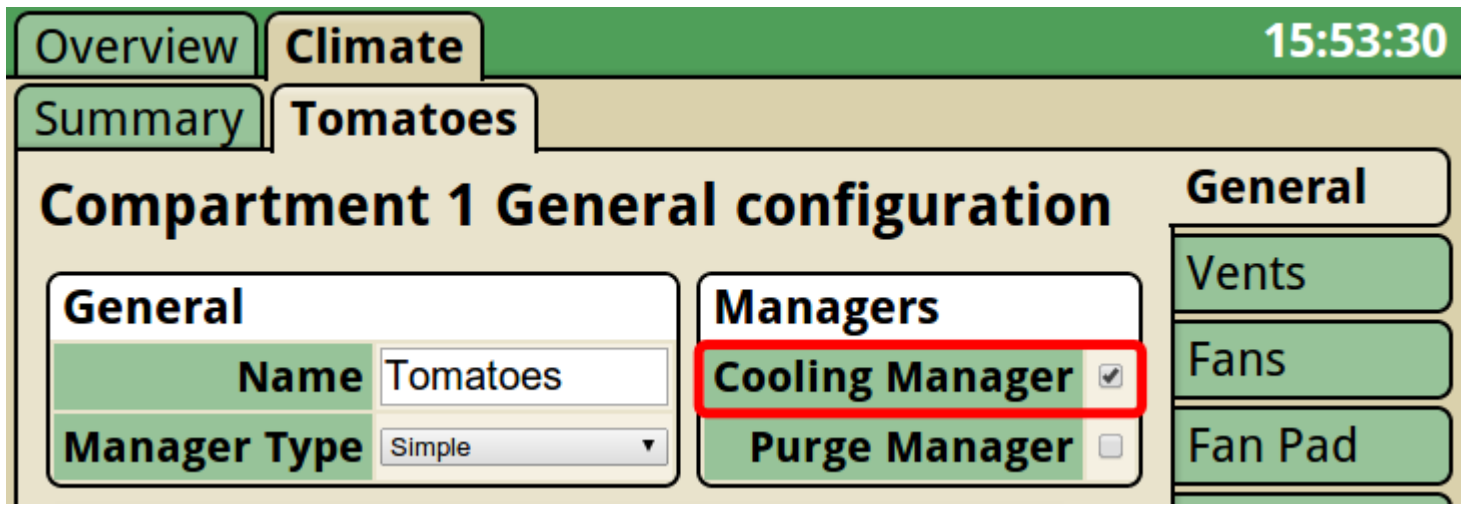
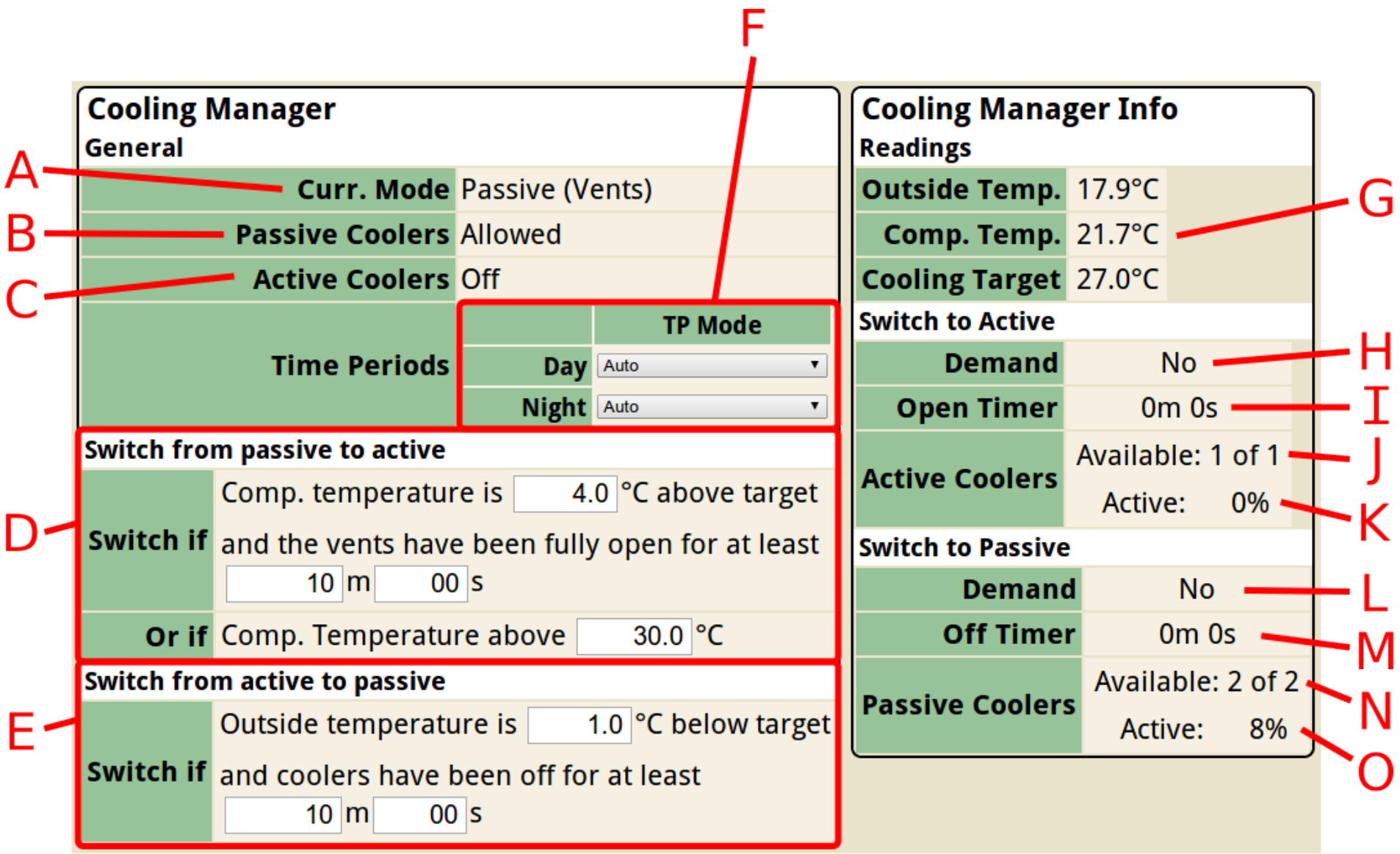


Then you will need to modify the settings for the Cooling Manager by going to **Settings > Climate > Tomatoes > Managers**.



Annotation	Name	Description
A	**Current Mode**	The current mode that the cooling manager is in (passive uses vens, active uses fan pads)
B	**Passive Coolers**	Denotes whether passive coolers are allowed to be used (in this case they are **Allowed**)
C	**Active Coolers**	Denotes whether active coolers are allowed to be used (in this case they are **Off** - not allowed)
D	**Passive to Active rules**	Describes (with settable values) when the cooling manager is allowed to switch from passive to active cooling
E	**Active to Passive rules**	Describes (with settable values) when the cooling manager is allowed to switch from active to passive cooling
F	**Time Period Modes**	Allows you to specify the cooling in specific time periods • **Active Only:** Active cooling only • **Passive Only:** Passive cooling only • **Independent:** Both active and passive can run at the same time • **Auto:** Let the cooling manager decide
G	**Comp. Temp.**	The temperature in the compartment right now
H	**Active Demand**	Is there a demand to switch to active cooling?
I	**Open Timer**	How long the vents have been fully open for (getting to 10m it will switch cooling to active)
J	**Available Coolers**	How many active coolers are available

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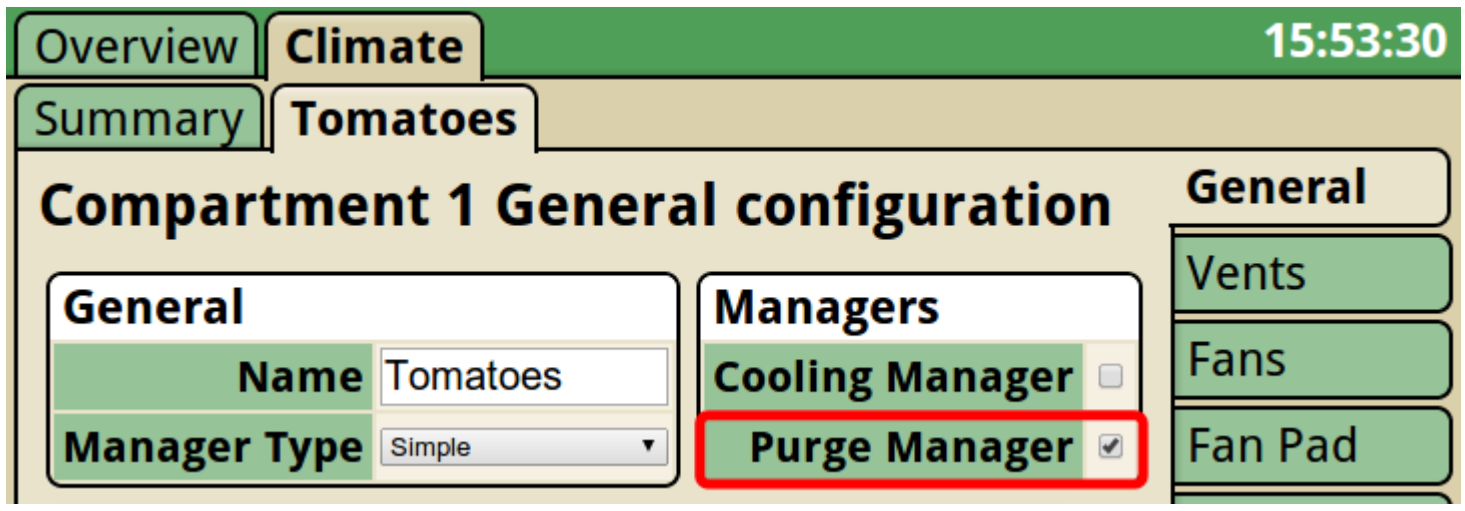
Annotation	Name	Description
K	**Activity level**	How active are the active coolers currently (averaged between multiple)
L	**Passive Demand**	Is there a demand to switch to passive cooling?
M	**Off Timer**	How long the active coolers have been off (getting to 10m will switch cooling to passive)
N	**Passive Coolers**	How many passive coolers are available
O	**Activity level**	How far open are the vents currently (averaged between multiple)

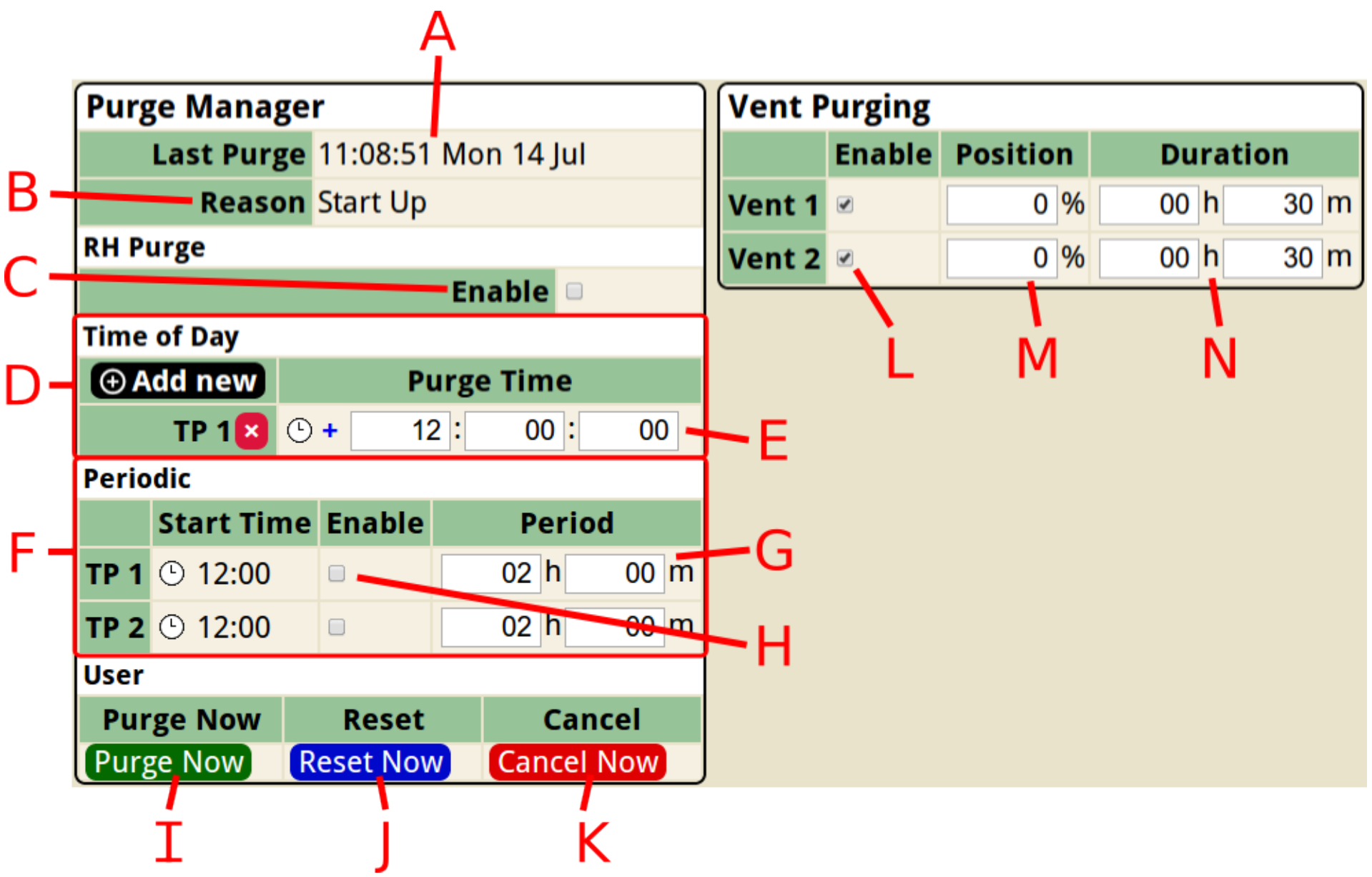
Purge Manager

When enabled, the Purge Manager will manage the purging of air to bring down humidity or bring in fresh air so the plants have fresh carbon dioxide to eat.

Purging Managers are enabled per compartment manager. To enable it you will need to go to **Configuration > Climate > Tomatoes > General**, tick the box labelled **Purging Manager** and push the **Save** button that appears.



Then when you go to **Settings > Climate > Tomatoes > Managers** you will see the purge manager settings:



Annotation	Name	Description
A	**Last Purge**	Displays the last time the compartment was purged

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Annotation	Name	Description
B	**Reason**	Displays the reason for the last purge
C	**Enable RH Purge**	Enables purging on relative humidity levels
D	**Time of Day purges**	Contains purge schedules set for a specific time of day
E	**Purge Time**	The scheduled time for a purge (Midnight + hours:minutes:seconds). In this case the purge will happen at 12 noon
F	**Periodic purges**	Contains schedules for purges to happen periodically within a time period
G	**Purge Period**	Set how often purges should happen (in this case every 2 hours)
H	**Purge Period Enable**	When checked, enables the purging every specified period
I	**Purge Now Button**	Does a purge immediately
J	**Reset Now Button**	Resets the purge triggers
K	**Cancel Now Button**	Cancels a purge
L	**Enable Checkbox**	Enables purging per vent
M	**Position**	Purging position of the vent
N	**Duration**	How long the vents should stay in the purge position for

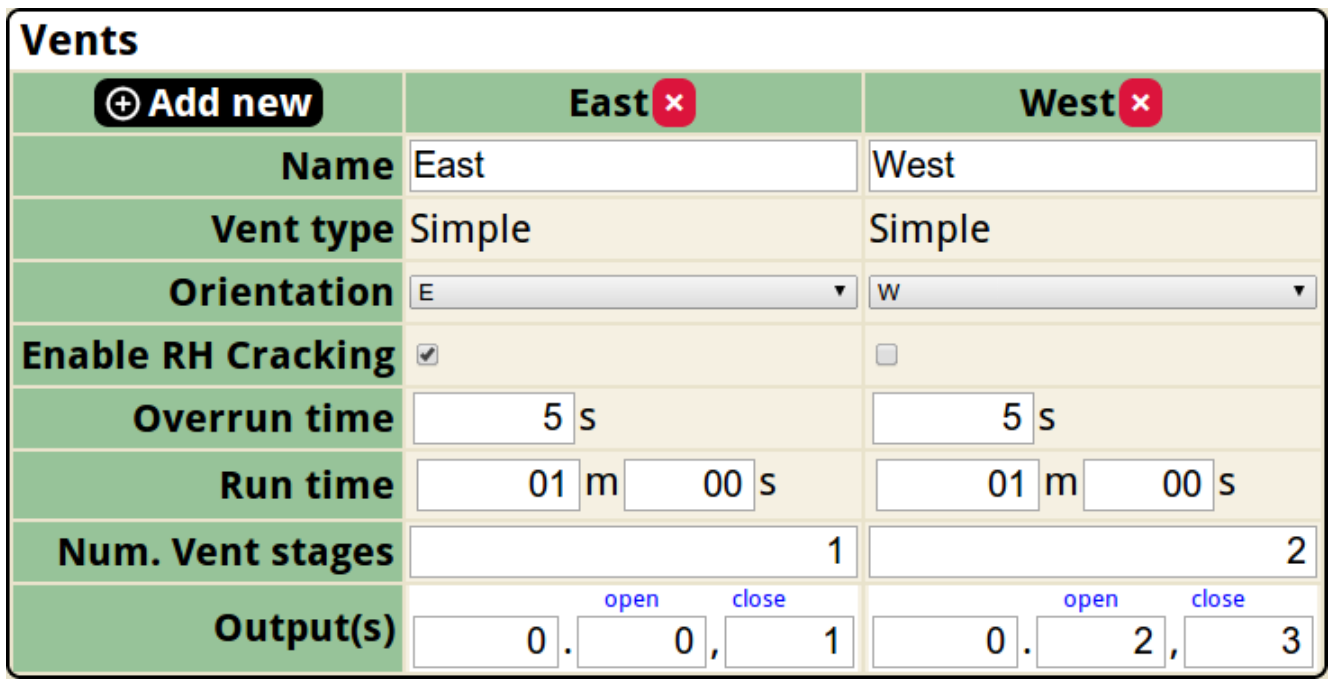
Vents

Vents are used to control the temperature in the compartment by opening to let cool air in and warm air out or closing to trap warm air in. This also has an effect on humidity. The purge and cooling manager will use the vents, among other equipment, to regulate these conditions.

Vents are not limited to just the typical vents you see on a greenhouse roof/walls. A retractable wall can be a vent and vent stages can be setup to incrementally retract the wall depending on the temperature.

Configuration

To configure vents, navigate to **Configuration > Climate > Summary** and tick the checkbox labelled **Vents Installed**. Push the **Save** button that appears and navigate to **Configuration > Climate > Tomatoes > Vents**. Push the **Add new** button to add a new vent.



Field	Description
Name	The name for this vent
Vent type	The type of vent
Orientation	The orientation of the vent
Enable RH Cracking	Enables cracking the vents if the RH gets too high
Overrun time	How long to run over the run time to ensure the limit switch is activated
Run time	How long it takes to run the vent motors from fully open to fully closed
Num Vent stages	Number of stages for the vents
Output(s)	The output addresses for the vents

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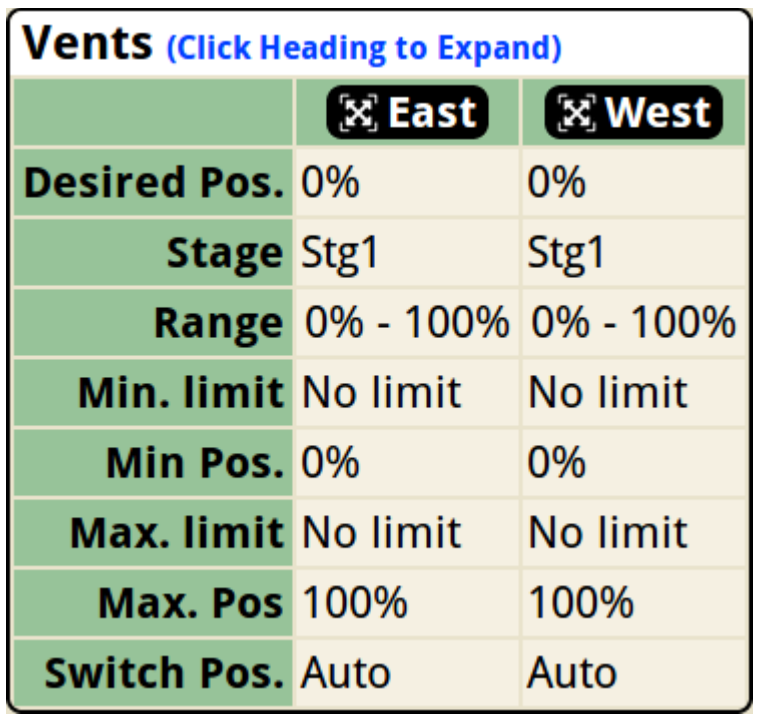
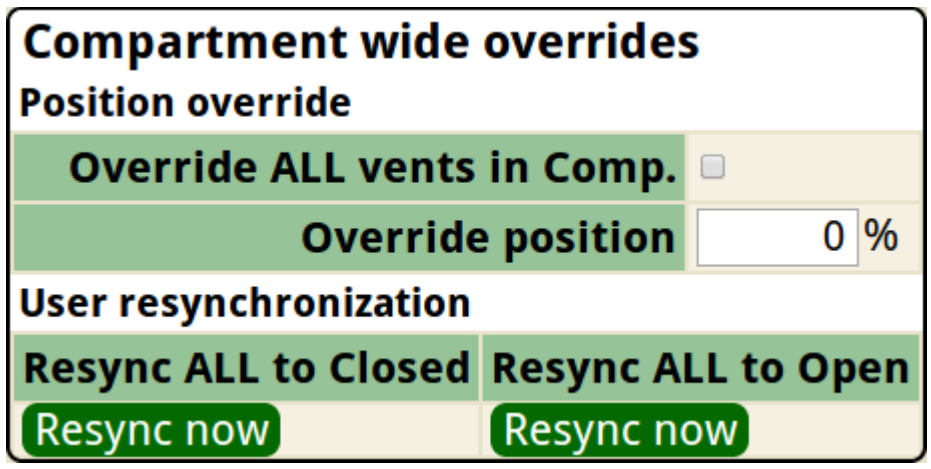
Settings

Navigate to **Settings > Climate > Tomatoes > Vents** to setup the control options for your vents:


Vents (Click Heading to Expand)
East
West
Desired Pos. 0% 0%
Stage Stg1 Stg1
Range 0% - 100% 0% - 100%
Min. limit No limit No limit
Min Pos. 0% 0%
Max. limit No limit No limit
Max. Pos 100% 100%
Switch Pos. Auto Auto

Field	Description
Desired Pos	The current desired position of the vent
Stage	The current stage
Range	The range of the vents
Min limit	The minimum limit for the vent
Min Pos	The minimum position for the vent
Max limit	The maximum limit for the vent
Max Pos	The maximum position for the vent
Switch Pos	The current switch position

Compartment wide overrides



Field	Description
Override ALL vents in Comp	When ticked, this will cause all vents to be overridden to the value specified in **Override position**
Override position	The position to override all the vents to when enabled
Resync now button	Resync all the vents to open or closed

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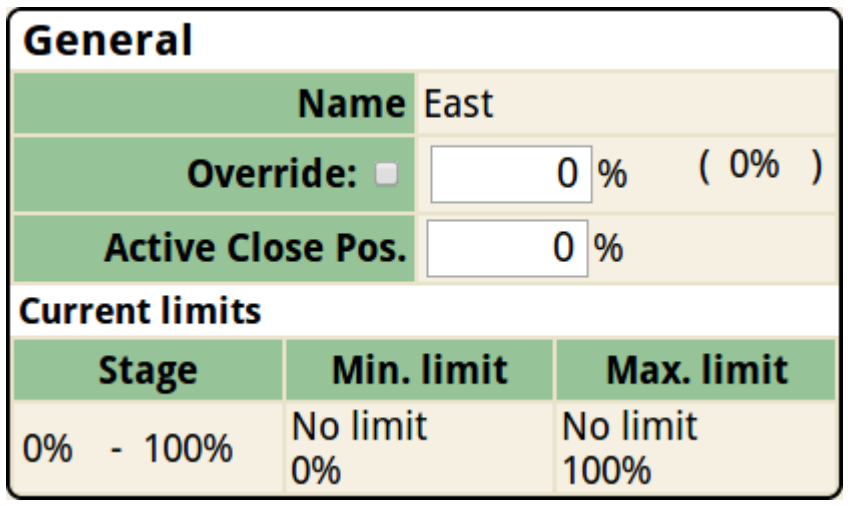
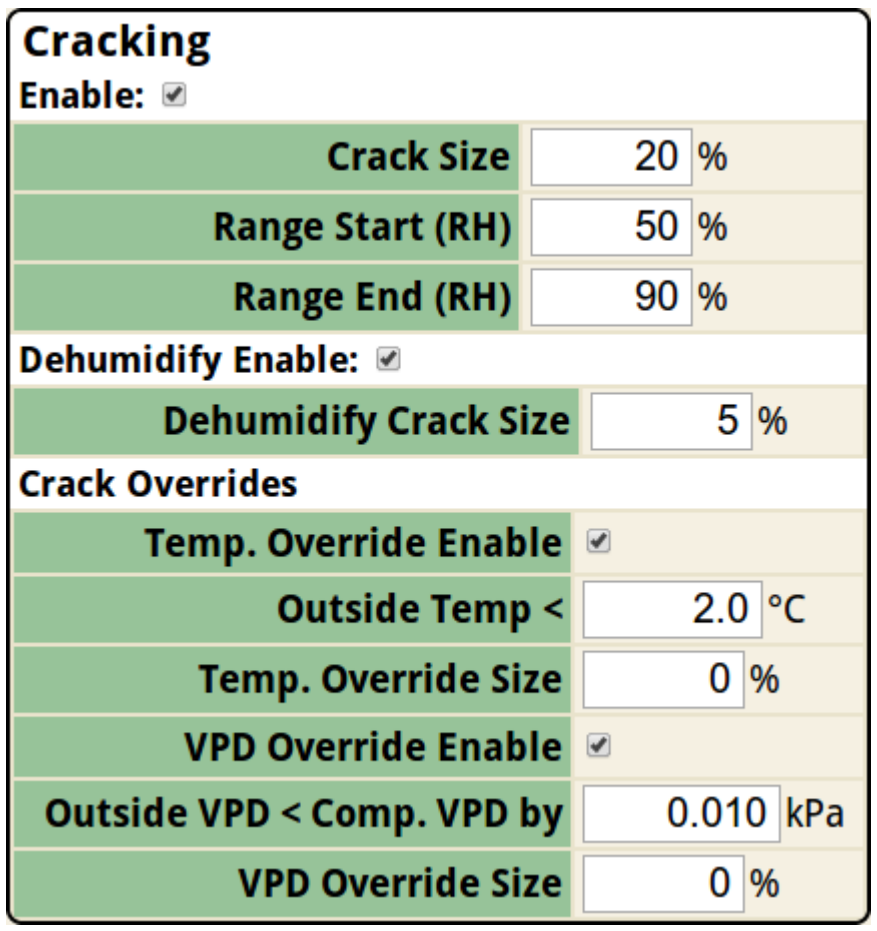
General



Field	Description
Name	The name of the vent
Override	Override the vent position to the value specified (with the current position)
Active Close Pos	The position the vent should go to once active cooling (e.g. fans, fanpad) starts

Cracking

The Multigrow can crack the vents if the RH gets too high inside the compartment, thus letting the wet air out. However cracking the vent could be a problem if the VPD or temperature outside would have adverse effects on the compartment conditions. The Multigrow will override the cracking in this case.



Field	Description
Enable	Enable cracking the vents if the RH is too high
Crack Size	The position to go to when trying to purge high RH
Range Start (RH)	The value above which to start cracking the vent proportionally
Range End (RH)	The value at which the vent position will be at the value specified in **Crack Size**
Dehumidify Enable	If there is heater dehumidifying in the compartment then crack the vent to let wet air out
Dehumidify Crack Size	Crack to this position when there is a heater dehumidifying
Temp Override Enable	Allow overriding the cracking on temperature
Outside Temp <	If outside temperature is less than 2°C of the cooling target override the cracking

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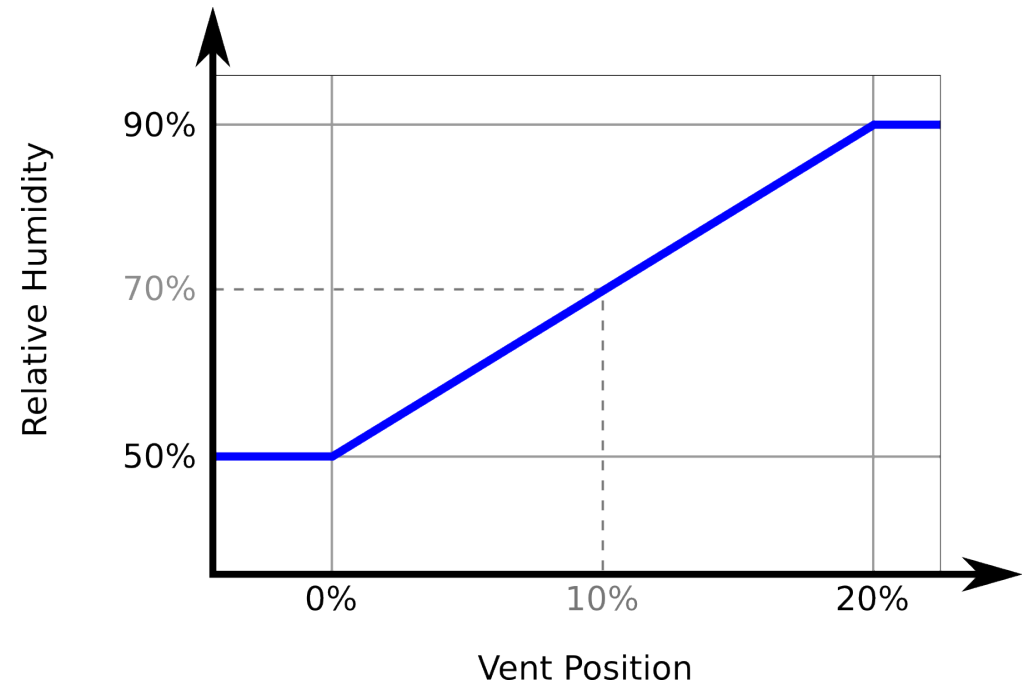
Field	Description
Temp Override Size	Go to this position when the temperature overrides the cracking
VPD Override Enable	Override the cracking on VPD
Outside VPN < Comp. VPD by	Override the cracking when the Outside VPD is the value specified less than the compartment VPD
VPD Override Size	Go to this position when the VPD overrides the cracking

> If there are multiple cracking overrides then the one with the smallest position will win

When cracking for RH the vent position will be adjusted proportionally to the **Range Start (RH)** and **Range End (RH)**. Using the settings above the relationship between the RH and vent position can be visualized in the below diagram:



Vent stage details

> For this section, assume the compartment cooling target is 20°C

Vents stages allow you to set the vent position depending on the compartment temperature. Typically roof and wall vents would not need this explicit kind of setup, but things like retractable walls would.

Vent stage details

	Offset	Max position	Range
Stg 1	1.0 °C	30 %	2.0 °C
Stg 2	5.0 °C	100 %	2.0 °C

Field	Description
Offset	The offset from the compartment temperature, over which this vent will start opening
Max Position	The maximum position for this vent stage
Range	The range over which the vent is opened proportional to the compartment temperature (in the above setup, at 22°C the vent would be at 15%, and at 23°C; 30%

The following graph helps to visualize the relationship between vent limits, compartment temperature and the vent stages.

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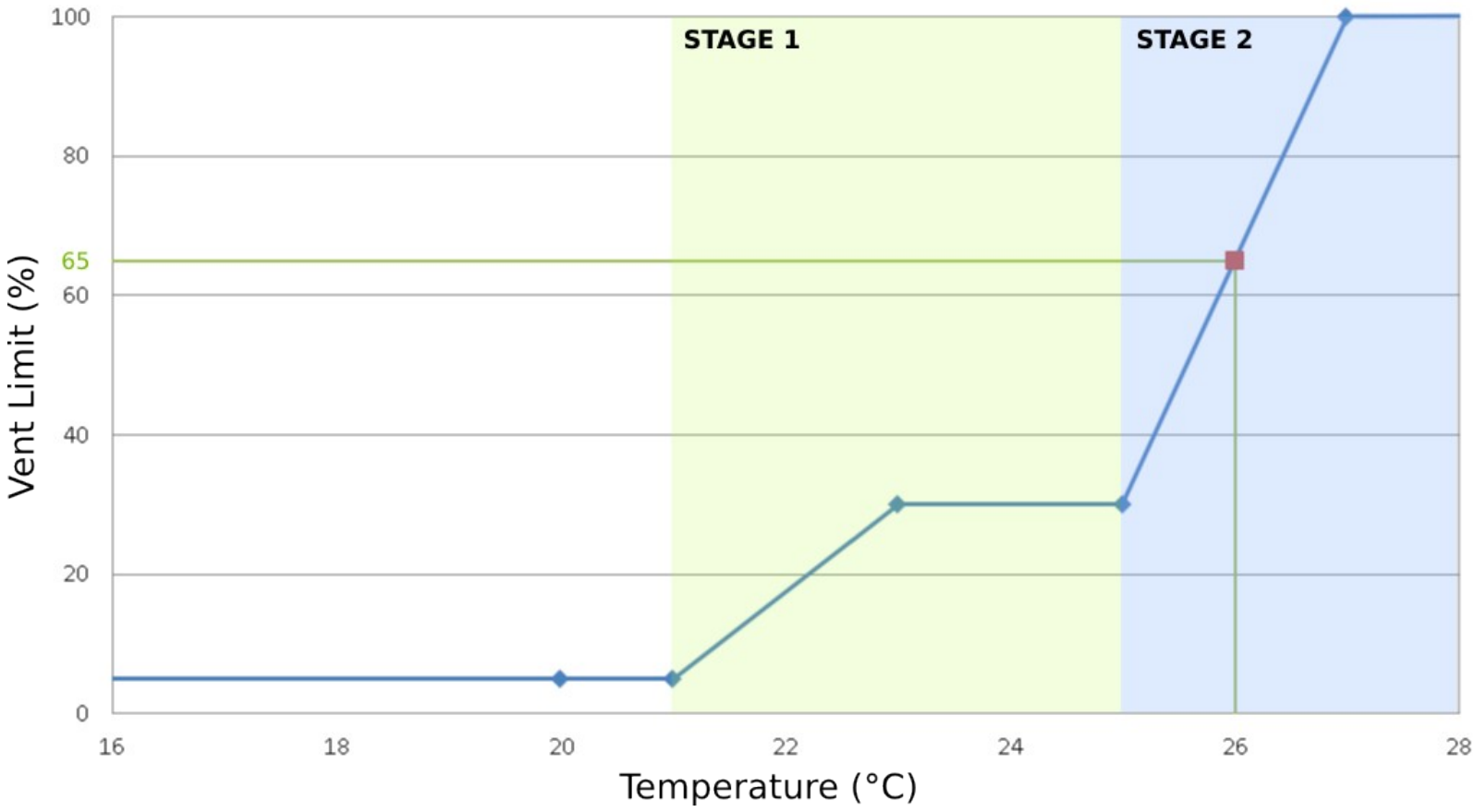

Wind Limits

Wind limits let you set the vent positions depending on the wind speed. This allows the Multigrow to protect the structure and vents while still maintaining some level of cooling during wind. It uses the **Orientation** information from the vent configuration, and the wind information from the weather station to determine which vents are facing the wind (windward) and which vents are facing away from the wind (leeward).

Wind Limits

Use effective wind for limits	☑	
Windward		
⊕ Add new	Speed	Limit
Limit 1 ×	0 km/h	100 %
Limit 2 ×	15 km/h	100 %
Limit 3 ×	25 km/h	90 %
Limit 4 ×	35 km/h	70 %
Limit 5 ×	50 km/h	20 %
Limit 6 ×	90 km/h	0 %
Leeward		
⊕ Add new	Speed	Limit
Limit 1 ×	0 km/h	100 %
Limit 2 ×	30 km/h	100 %
Limit 3 ×	40 km/h	95 %
Limit 4 ×	50 km/h	80 %
Limit 5 ×	60 km/h	30 %
Limit 6 ×	100 km/h	0 %

Field	Description
Use effective wind for limits	Use the wind speed calculated by the effective wind algorithm for the limits
Speed	The wind speed
Limit	The position that the vent is limited to for the wind speed

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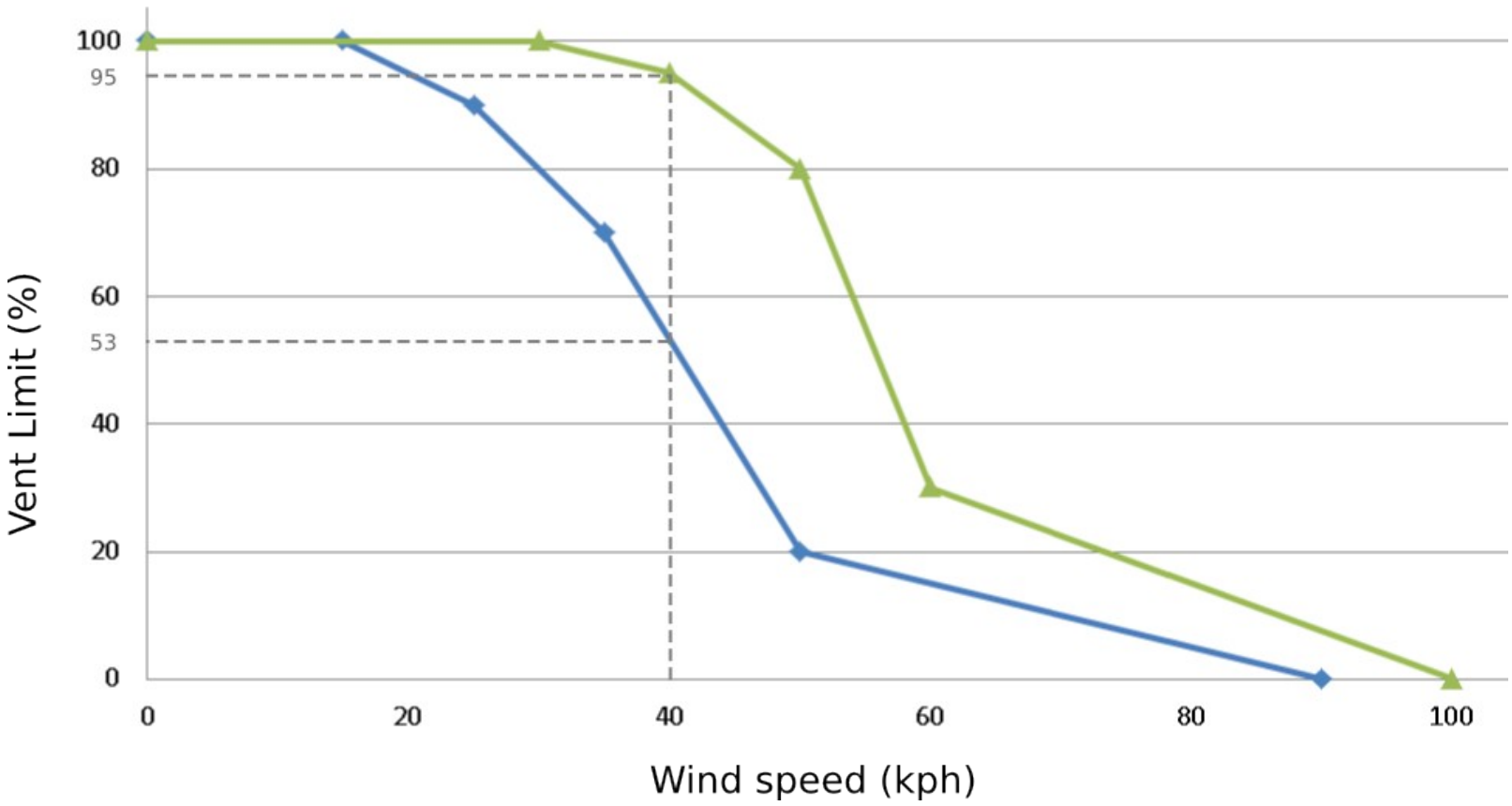
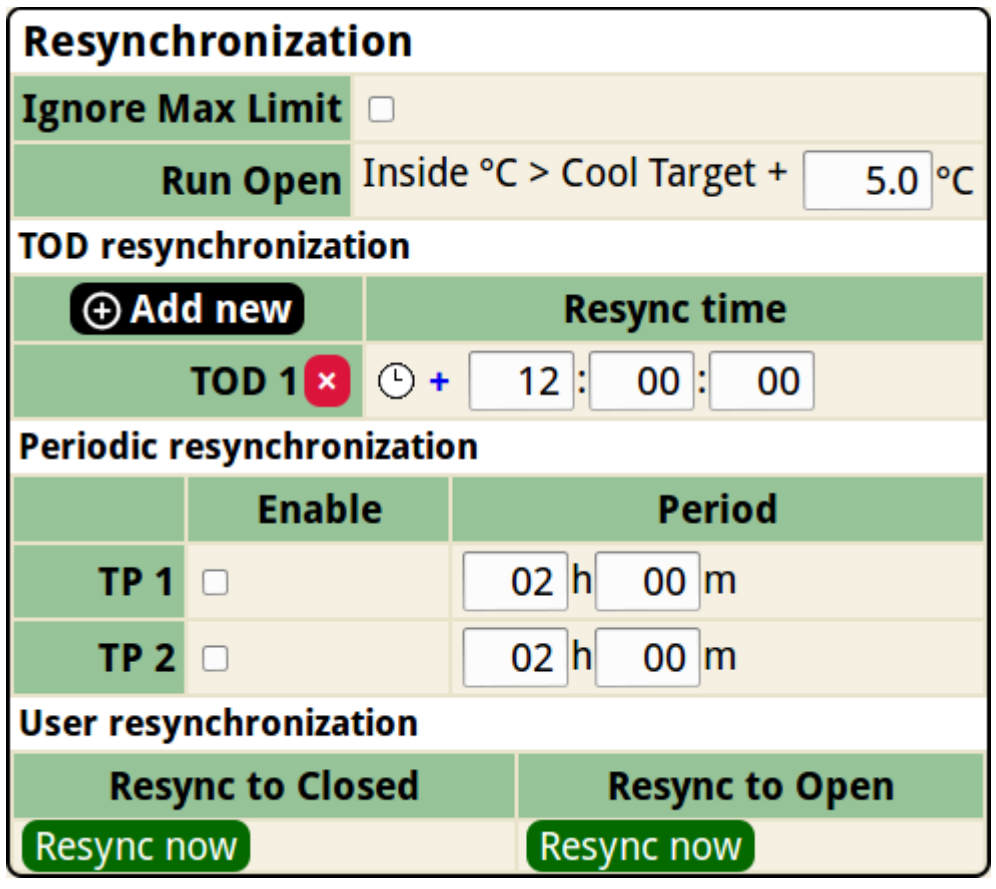
It may be easier to visualize the above wind limits using the following graph to demonstrate the relationship between wind speed and the vent position limit:



The windward vent is represented by the blue line, the leeward represented by the green line. You can see that when the wind speed is at 40kph the vent will be limited to 53% open on the windward side, while the leeward side is still allowed to open to 95%.

Resynchronization

Sometimes the run times of vent motors will change due to physical effects that the Multigrow cannot foresee. For this reason resynchronization of the vents may be need occasionally so the Multigrow can get back to a known fully open, or fully closed position.



Field	Description
Ignore Max Limit	When checked, the vents will open more than the **Max Limit** in order to resynchronize
Run Open	Run to open if the compartment temperature is too high
TOD resynchronization	Resynchronize at a specific time of day
Resync time	When to do a TOD resync
Periodic resynchronization	Resynchronize periodically throughout the day
Enable	Enable periodic resync in this time period

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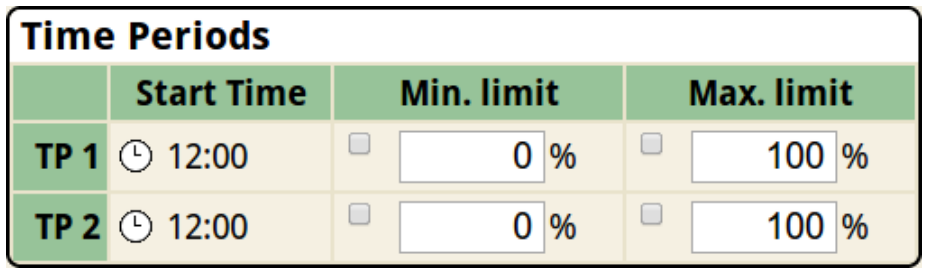
Field	Description
Period	Every time this period has elapsed, do a resync
Resync now button	Immediately do a resync to either open or closed

Time Periods

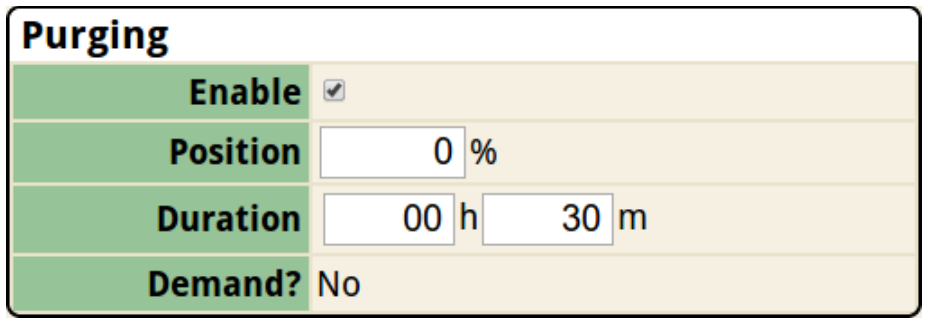
This section allows you to specify limits for the vents within certain time periods.



Field	Description
Min Limit	The minimum position this vent can close to during this time period
Max Limit	The maximum position this vent can open to during this time period

Purging

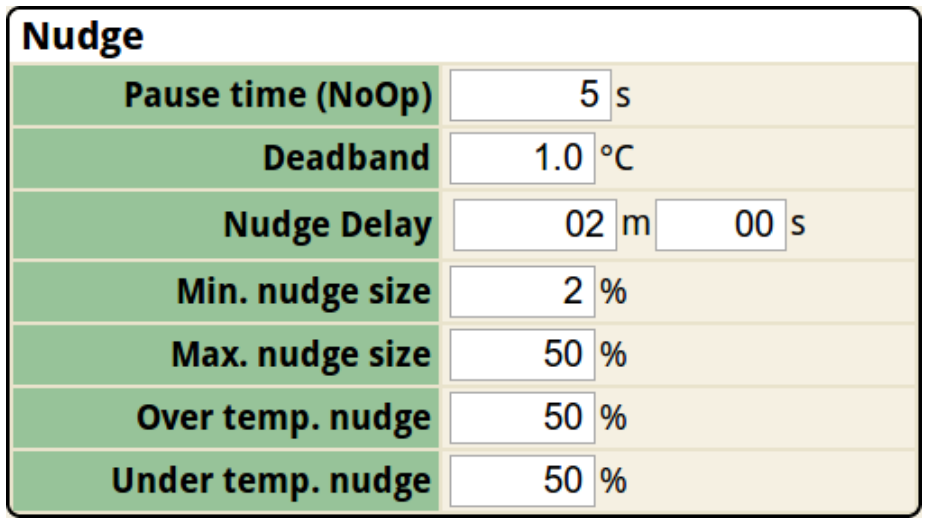
Vents can be used by the Purge Manager to purge air from the compartment in certain conditions. The vent must have purging enabled to be used by the purge manager.



Field	Description
Enable	Enable purging for this vent
Position	The position the vent should move to when purging
Duration	The duration to stay at the purging position
Demand	Is there demand to purge right now?

Nudge

When changing position the vents use "nudging". The Multigrow will analyze the conditions in the compartment, as well as outside to determine if it needs to change the vent position and by how much. If it determines that it does need to change the vent position it will do so, and then wait for the specified delay period to reanalyze and action a nudge if required.



Field	Description
Pause time (NoOp)	The time to wait before reversing the direction the vent moves (in the case of a wind event during an nudge causing the vent to close)
Deadband	The deadband around which the
Nudge Delay	How long to wait between nudges
Min nudge size	The minimum nudge size

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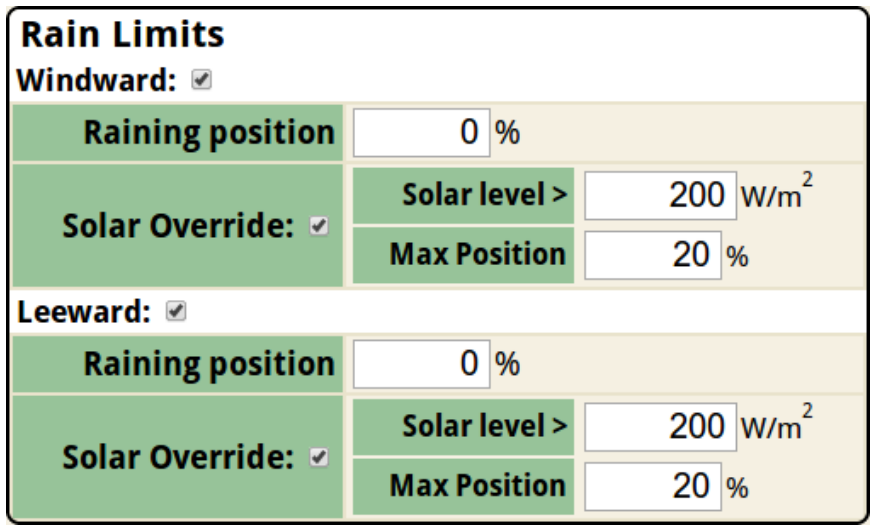
Field	Description
Max nudge size	The maximum nudge size
Over temp nudge	The nudge size to use if the compartment temperature is over the cooling target
Under temp nudge	The nudge size to use if the compartment temperature is under the cooling target

Rain Limits

Some crops are very sensitive to rain. For this reason the Multigrow can adjust the vent position if it is raining to prevent rain entering the vents and harming the crop. The Multigrow detects rain using the weather station. The rain sensitivity can be adjusted per compartment by modifying the **Rain Trip Frequency** field on the compartment general settings page.

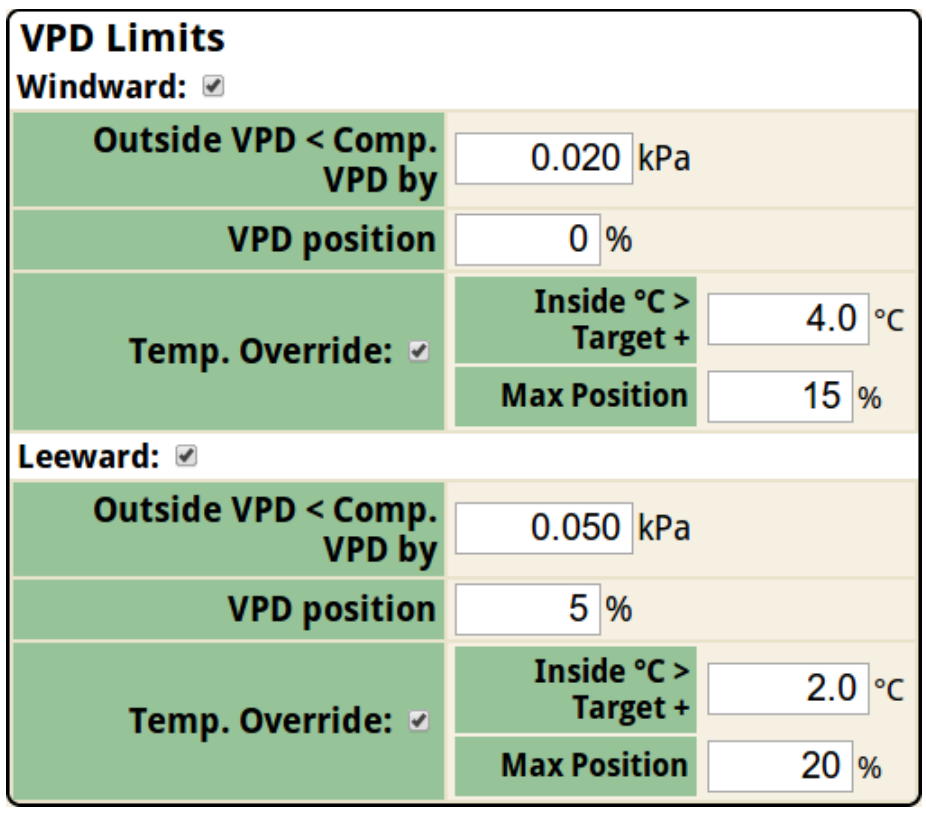
> If there is still a high level of Solar RAD entering the compartment during rain (in the case of a sun shower for instance), it could get too hot if the vents go to fully closed. For this reason the Multigrow can keep the vents open if there is a decent solar influence.



Field		Description
Windward	**Raining position**	The position to set the vents to if it is raining on the windward side
	Solar Override Solar level >	Override the **Raining Position** if the Solar RAD is greater than this value
	Solar Override Max Position	Set the vent to this position instead of the **Raining Position** if it is raining and there is solar influence
Leeward	**Raining position**	The position to set the vents to if it is raining on the leeward side
	Solar Override Solar level >	Override the **Raining Position** if the Solar RAD is greater than this value
	Solar Override Max Position	Set the vent to this position instead of the **Raining Position** if it is raining and there is solar influence

VPD Limits

The VPD limits allow the Multigrow to control the vents depending on the VPD inside and outside the compartment.



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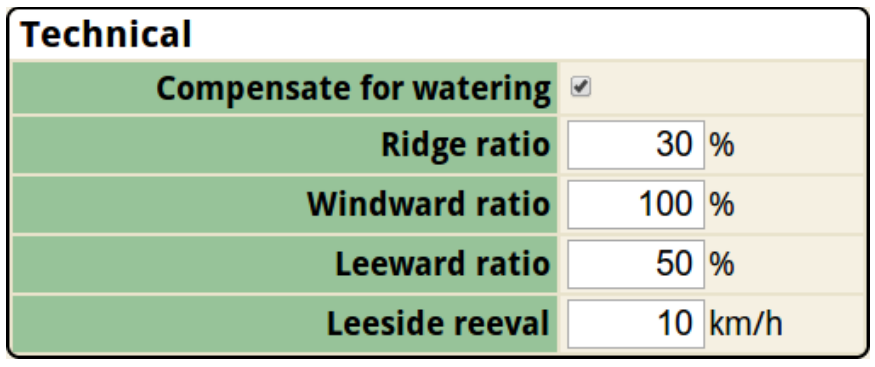
Field		Description
Windward	**Outside VPD < Comp VPD by**	When the VPD inside and out differs by more than this value then enact the vent limit to **VPD positon** on the windward side
	VPD Position	Set the vent position to this value if a VPD limit is enacted
	Temp Override Inside °C > Target+	When the compartment temperature is greater than the cooling target plus this value, enact the temperature override
	Temp Override Max Position	When the temperature override is enacted on top of a VPD limit on the windward side, set the vent position to this value
Leeward	**Outside VPN < Comp VPD by**	When the VPD inside and out differs by more than this value, enact a VPD limit on the leeward vent
	VPD position	If the VPD limit has been enacted, set the vent position to this value
	VPD Position	Set the vent position to this value if a VPD limit is enacted
	Temp Override Inside °C > Target+	When the compartment temperature is greater than the cooling target plus this value, enact the temperature override
	Temp Override Max Position	When the temperature override is enacted on top of a VPD limit on the leeward side, set the vent position to this value

Technical

These are advanced settings for modifying various influences on the vents.



Field	Description
Compensate for watering	As watering will cool the compartment, stop the vents from closing for a few minutes after watering due to temperature drop inside the compartment
Ridge ratio	Adjusts the effective cooling when wind is blowing along the ridge
Windward ratio	Adjusts the effective cooling when the vent is windward
Leeward ratio	Adjusts the effective cooling when the vent is leeward
Leeside re-eval	Don't re-evaluate the leeward side unless the wind speed is above this value, to stop small omni-directional gusts causing the Multigrow to flap the vents

Reading

You can see the current readings for the vents by navigating to **Readings > Climate > Tomatoes**:

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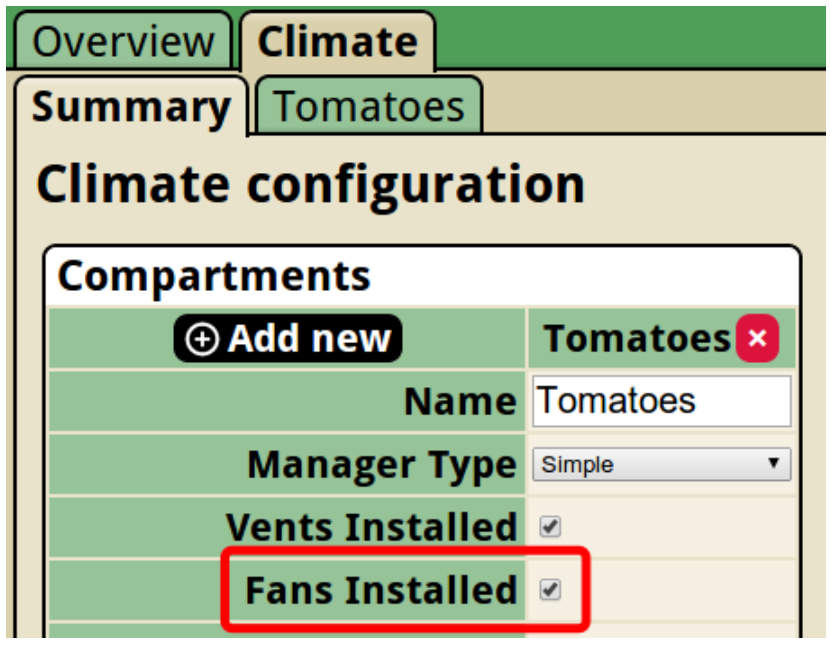
Vents		
	East Vent	**West Vent**
Stage	Stg1 0% - 100%	Stg1 0% - 100%
Min. limit	No limit 0%	No limit 0%
Max. limit	No limit 100%	No limit 100%
Desired Pos.	20%	100%
Current Pos.	20%	100%
Output State	Off	Off
Switch Pos.	Auto	Auto
Fuse	OK	OK
Side	Windward	Leeward
Effective wind	17km/h	1km/h

Field	Description
Stage	The current vent stage
Min limit	The minimum limit for the vent
Max limit	The maximum limit for the vent
Desired Pos	The desired position of the vent
Current Pos	The current position of the vent
Output State	The state of output driving the vent motors, either *Off* or *On*
Switch Pos	The switch position of the output driving the vent motors, either *Auto* or *Manual*
Fuse	The status of the fuse on the output module
Side	Which side of the wind this vent is on
Effective wind	The effective wind going into this vent

Fans

Horizontal Air Flow Fans are critical for consistent temperature and humidity levels across the environment. They promote good mixing of air lowering the average humidity and ensuring even distribution of CO_2. They can also assist with fogging and spray distribution and the purging of stale greenhouse air (although the latter is not currently controlled by the Multigrow purge manager).

Fans are configured per climate manager. Navigate to **Configuration > Climate > Summary** and tick the checkbox called **Fans Installed** on the **Tomatoes** compartment, and push **Save** button that appears:



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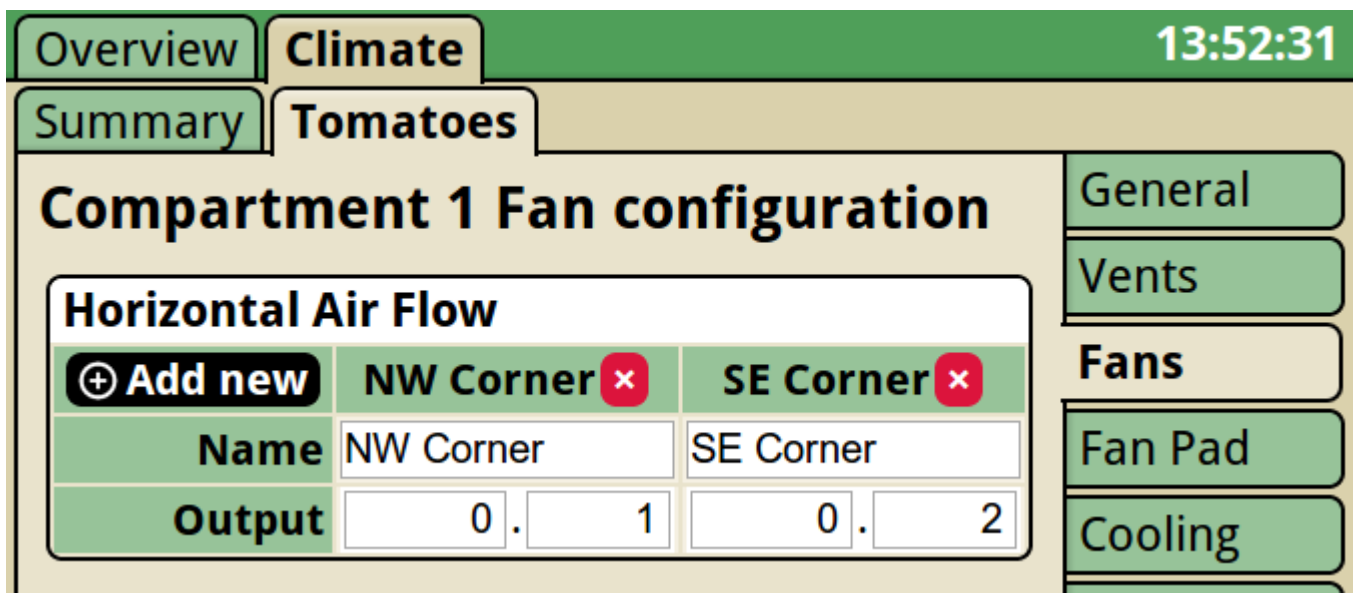
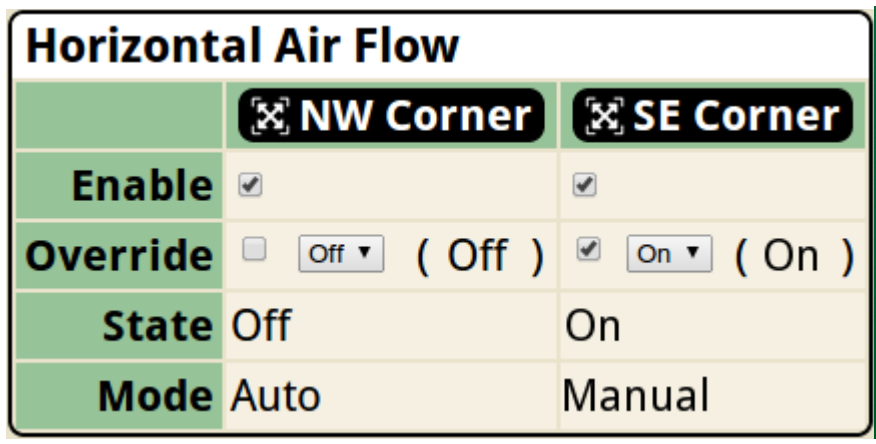
Now when you push the **Climate** tab from the Secondary Menu you will see that the **Fans** tab has been added to the Tertiary Menu. Pressing it will take you to the fans configuration page. Push the **Add new** button to add as many fans as you need, and enter their names and output addresses:



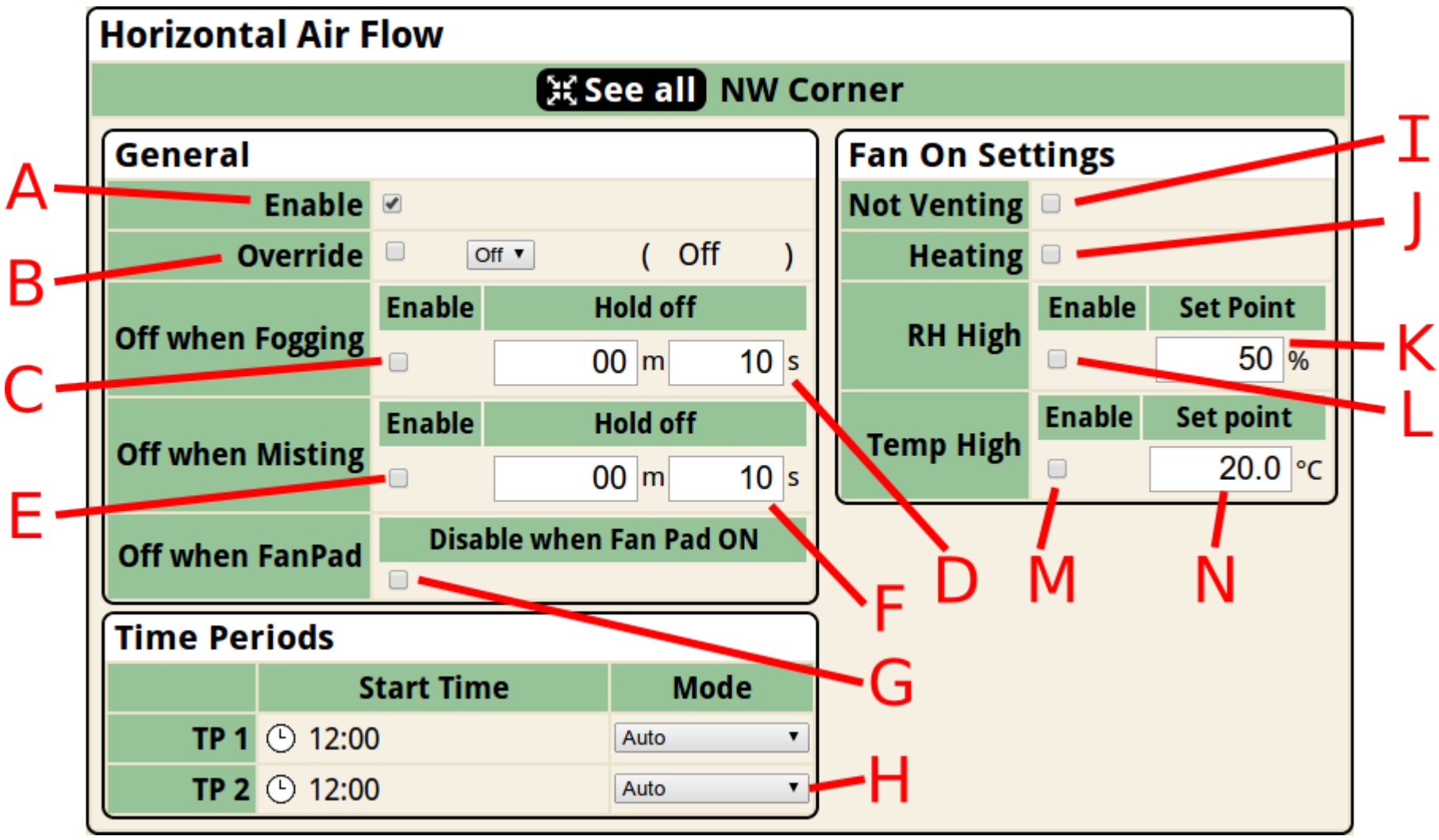
Push the **Activate** button on the configuration banner and navigate to **Settings > Climate > Tomatoes > Fans**. You will see the fans listed on this page however in a slightly different format:



In the fan table each fan can be individually enabled or overriden by ticking the checkboxes in **Enable** or **Override**. When overriding you need to select what state you want to override it to; "*Off*" or "*On*". The current state of the fan is shown after the **Override** select box and in the **State** column.

As you can see in the above images, the **SE Corner** fan is overridden to *On*, and the **Mode** is *Manual*. This means the **State** is currently *On*. When looking at the output switch, you can see that the switch for the **SE Corner** fan (*2*) is switched to the on position. With a setup like this we have made the fan manually switched.

Clicking on the expander button at the top of the fan table called **NW Corner** will give access to more settings about the fan:



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Annotation	Name	Description
A	**Enable**	Enables the fan (mimicked from small fan table)
B	**Override**	Overrides the fan control (mimicked from small fan table)
C	**Off When Fogging Enable**	Disables the fan when the fogging is active
D	**Off When Fogging Holdoff**	How long to wait after fogging stops before turning on the fan
E	**Off When Misting Enable**	Disables the fan when misting is active
F	**Off When Misting Holdoff**	How long to wait after misting stops before turning on the fan
G	**Off When Fanpad Enable**	Disables the fan when fan pad is active
H	**Per Time Period Mode**	Allows you to specify what mode the fan should be in during each time period • **Off:** fan off in this time period • **Auto:** let the Multigrow decide which mode for this time period • **On:** fan is on in this time period
I	**Not Venting**	Turns the fans on when the vents are closed
J	**Heating**	Turns the fans on when heating
K	**RH High Enable**	Turns the fans on when the relative humidity gets too high
L	**RH High Set Point**	Turn the fans on when the relative humidity is this value or higher
M	**Temp High Enable**	Turn the fans on when the temperature gets too high
N	**Temp High Set Point**	Turn the fans on when the temperature gets to this value or higher

Navigating to the readings page at **Readings** > **Climate** > **Tomatoes** > **Fans** shows you the current readings for each fan such as the **State**, **Mode**, **Output State**, **Switch Pos**ition and **Fuse** status:

Horizontal Air Flow

	NW Corner	SE Corner
State	Off	On
Mode	Auto	Auto
Output State	Off	On
Switch Pos.	Auto	Manual
Fuse	OK	OK

Field	Description
State	Shows the current state of the fan, right now **SE Corner** is On
Mode	Shows the current control mode, this would be one of • **Auto:** the Multigrow is controlling the fan • **On:** the fan is forced to on in this time period • **Off:** the fan is forced to off in this time period
Output State	Shows if the output is currently on or off, **SE Corner** is currently on because the switch is set to On
Switch Pos.	The position of the switch on the Output Module. You can see **SE Corner** fan is currently *Manual* because the switch on the Output Module is not switched to Auto

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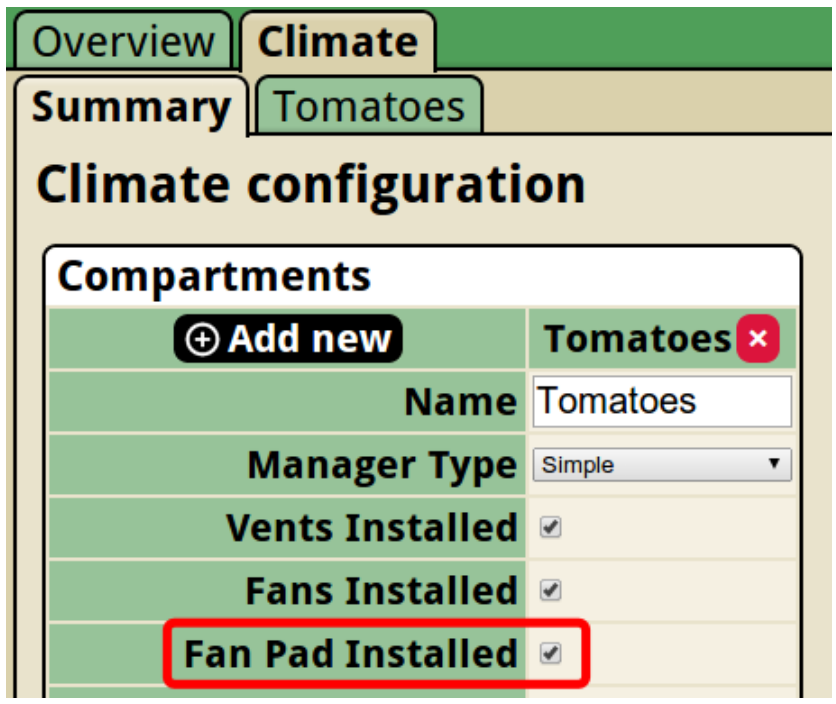
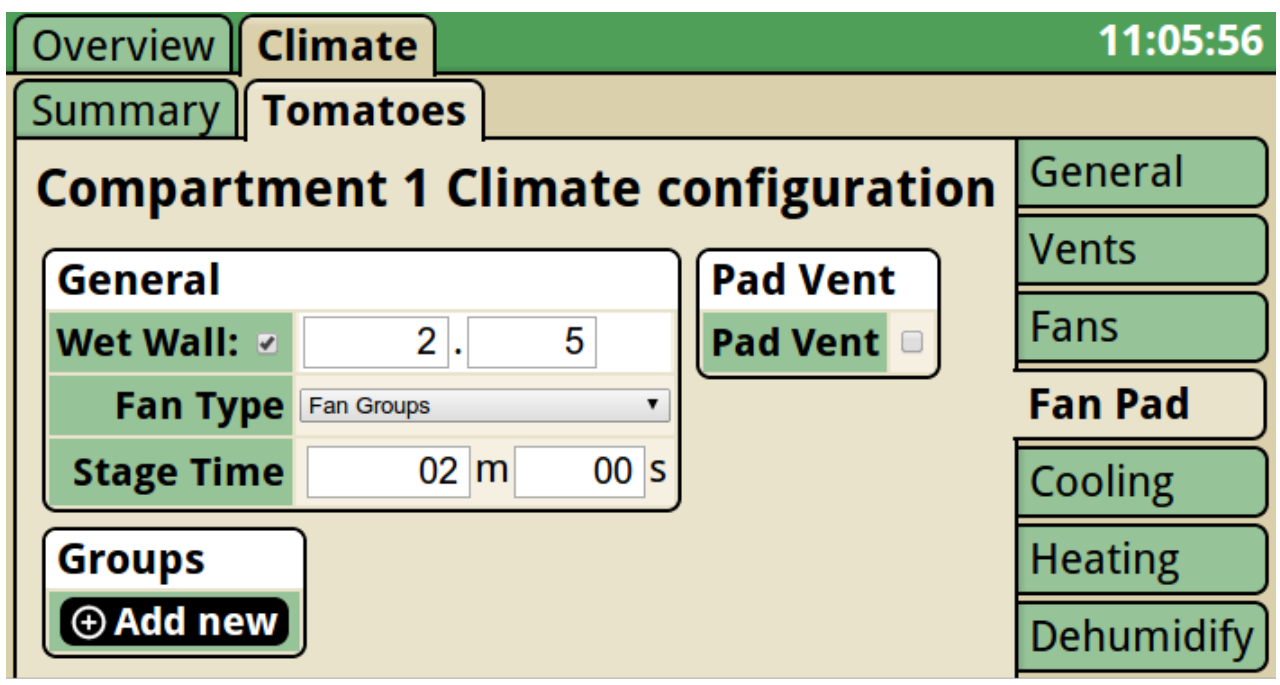
Fan Pad

Configuration

To enable Fan Pad ensure that the checkbox labelled **FanPad Installed** is ticked on the **Configuration > Climate > Summary** page for the compartment.



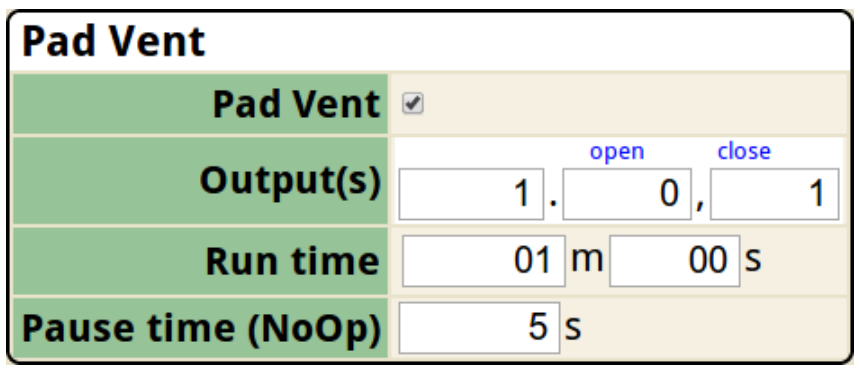
Push the **Save** button that appears and then press the **Fan Pad** tab that appears on the right in the Tertiary Menu to get to the Fan Pad configuration page:



Ticking the **Wet Wall** checkbox and pushing save will allow you to specify the output for the wet wall pump. The **Fan Types** field allows you to select between fan groups or three speed fans. The **Stage Time** field specifies how long to wait after running before running again. This ensures that some time has passed for the temperature to equalize and be read to determine if the cooling targets have been met yet.

Pad Vent

Ticking the checkbox labelled **Pad Vent** allows you to specify **Outputs** and **Run Time** so the Multigrow to open a vent on the pad side before running the fans. The **Pause time (NoOp)** field allows you to specify a time of no operation between closing and opening the vent. This can help prevent AC vent motors from overrunning.



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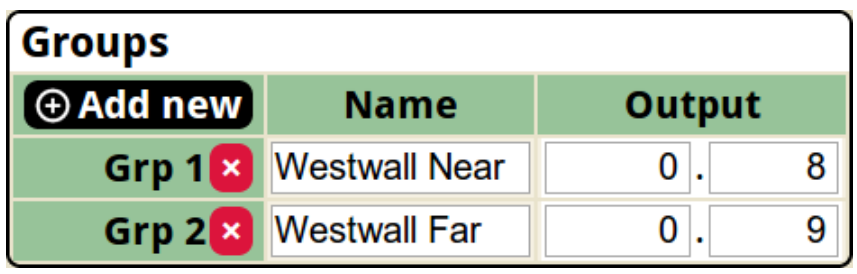
Fan Groups

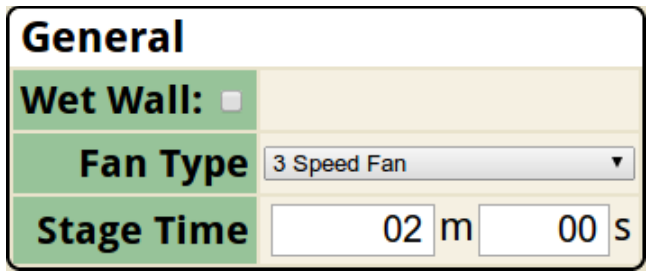
Fan groups are the simplest way to setup fans to run for the fan pad. You simply need to push the **Add new** button for as many groups as you need then enter the name and output. You can wire the output up to run groups of one fan or more.



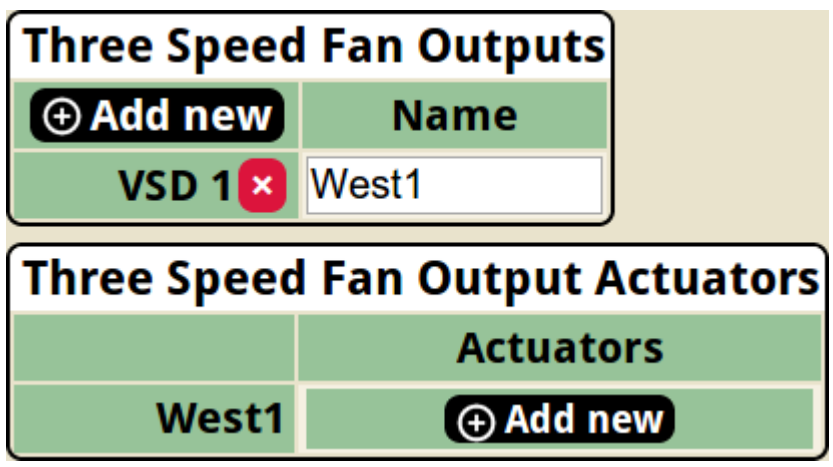
In this way you can configure your fans in a way that lets you ramp up the air velocity through the environment using just simple switching. For example when trying to reach a cooling target you may switch a group of two fans on. If the target is failing to be met you can switch on another groups of two fans.

Three Speed Fans

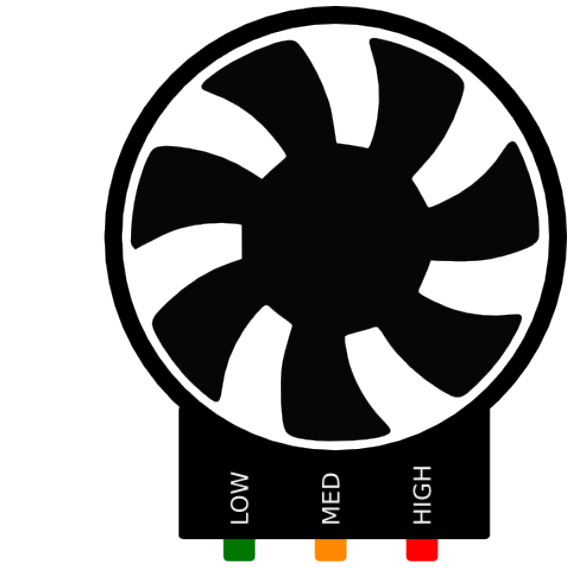
You can add three speed fans to the Fan Pad by changing the **Fan Type** to "*3 Speed Fan*" and pushing the **Save** button that appears.



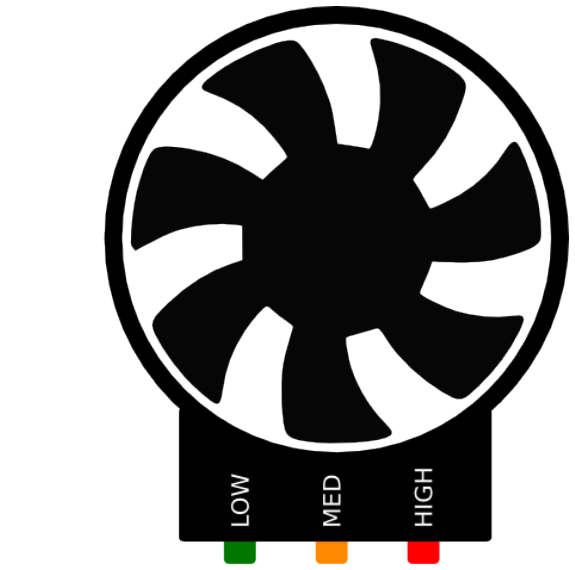
You will then see options for three speed fans appear. You can add a new three speed fan by pressing the **Add new** button underneath *Three Speed Fan Outputs*. For each fan you add you will see it an entry appear in the *Three Speed Fan Output Actuators* table below it (after pushing the **Save** button).



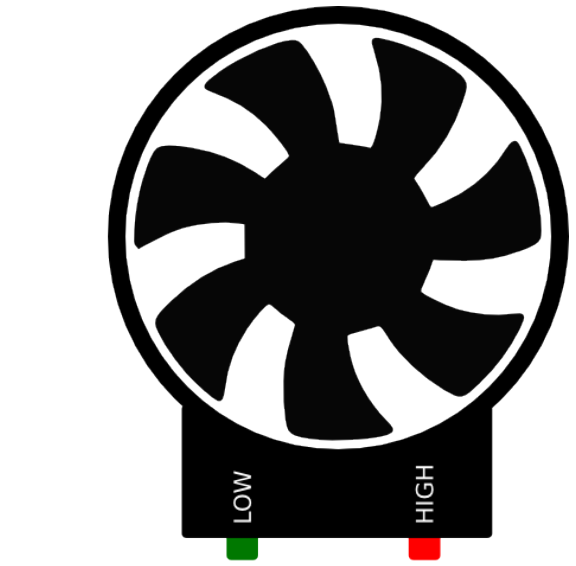
How you configure the fan speed actuators will depend on the type of VSD you have. The manual of the fan should explain how each speed level is actuated. A few possible configurations are shown below. The coloured squares on the side of the fan represent the inputs, and the coloured squares in the table indicate that when the input is actuated by an output.



Simple



Accumulative



Binary

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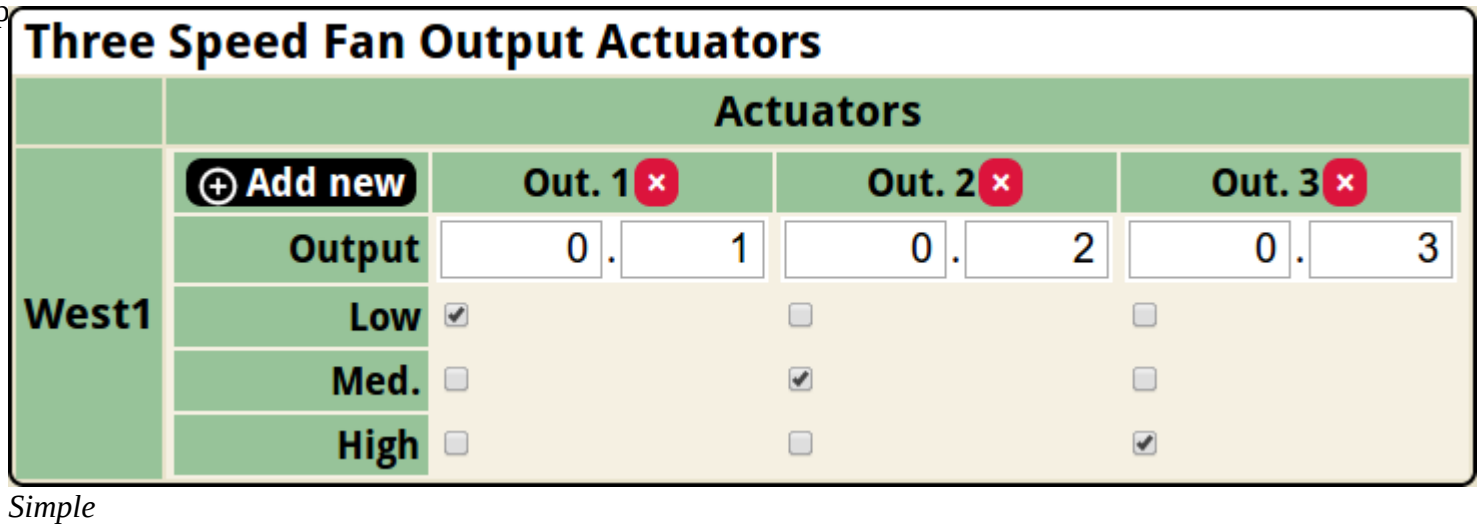
On **simple** fans one input, relative to the speed will need to be actuated, for instance:

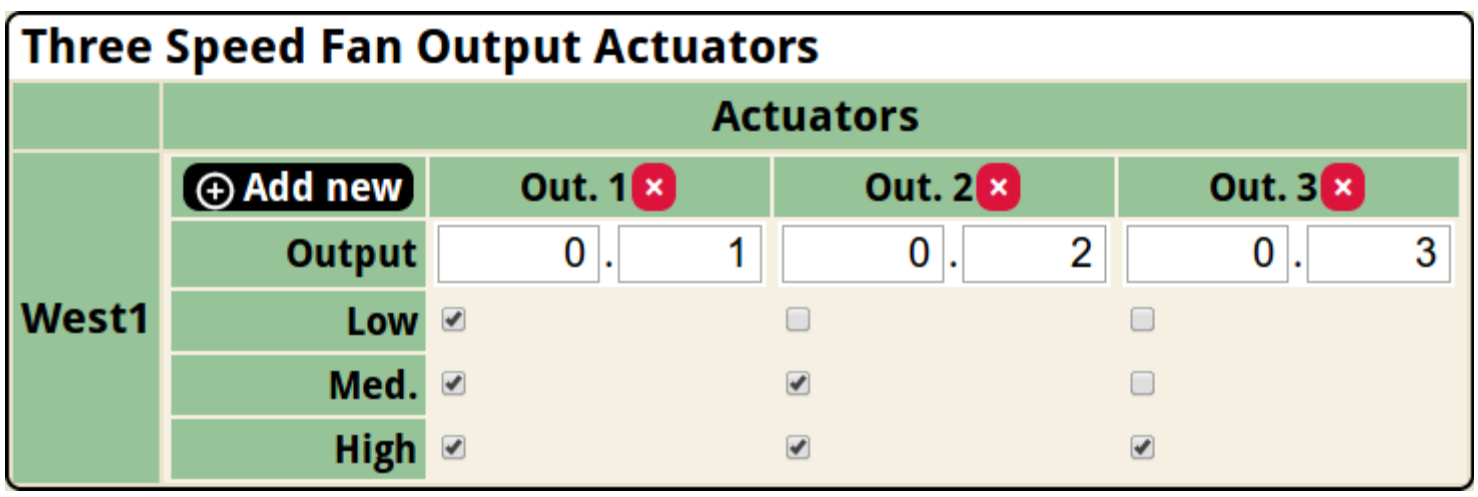
- Low: actuate low speed input
- Medium: actuate medium speed input
- High: actuate high speed inp



Simple

However **accumulative** fans will require all previous inputs to be actuated to attain the next level of speed, for instance:

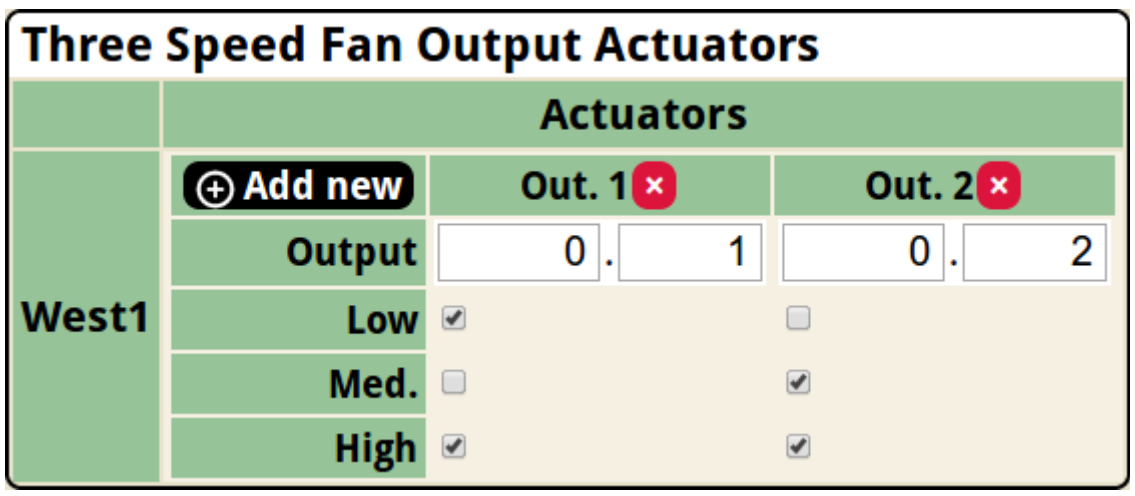
- Low: actuate low speed input
- Medium: actuate low and medium speed inputs
- High: actuate low, medium and high speed inputs



Accumulated

Binary fans will only have two inputs even though they have three speeds:

- Low: actuate low speed input
- Medium: actuate high speed input
- High: actuate low and high speed inputs



Binary

This configuration interface allows maximum flexibility in configuring speed controls for a wide range of variable speed drive fans.

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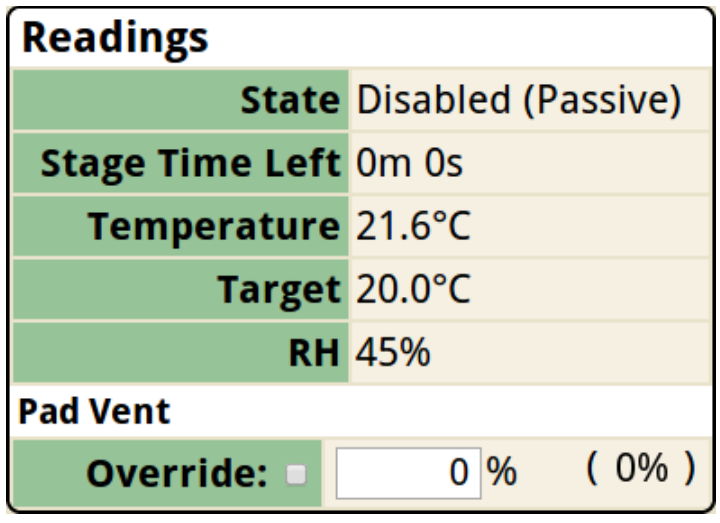
Settings

To setup the control rules for the fan pad navigate to **Settings > Climate > Tomatoes > Fan Pad**.

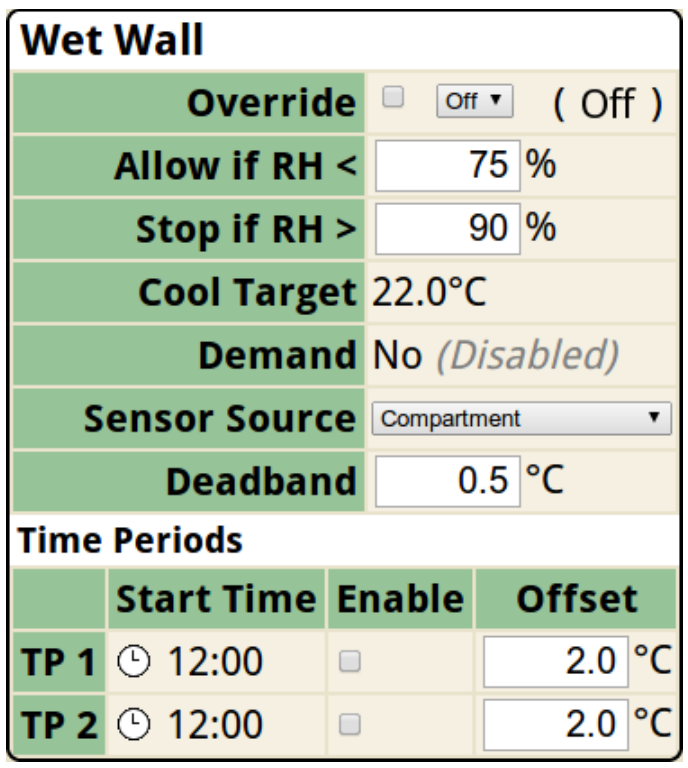


The first box on the screen simply shows some readings, such as the current **State**, how much **Stage Time [is] Left**, current compartment **Temperature**, compartment cooling **Target** and current compartment **RH**.

You can also force the Pad Vent to open to a specified percentage by ticking the **Override** checkbox and specifying the percentage. The current percentage is also shown.

Wet Wall

The following settings are available to control when the wet wall is turned on and off:



Field	Description
Override	Allows you to override the wet wall to on or off (currently off)
Allow if RH <	Only allow if the humidity is less than the value specified
Stop if RH >	Stop the wet wall if the humidity goes above the value specified
Cool Target	The cooling target for the wet wall (Compartment Cooling Target + Offset)
Demand	Is there demand for a wet wall right now?
Deadband	A dead band either side of the target to prevent outputs turning on and off repeatedly

You can also **Enable** or disable the wet wall during certain time periods, and only if the temperature is a specified **Offset** above the cooling target.

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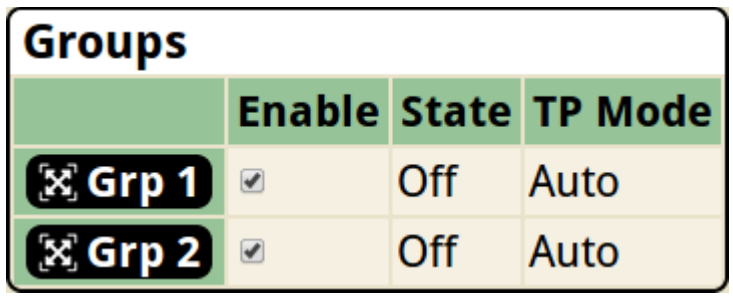
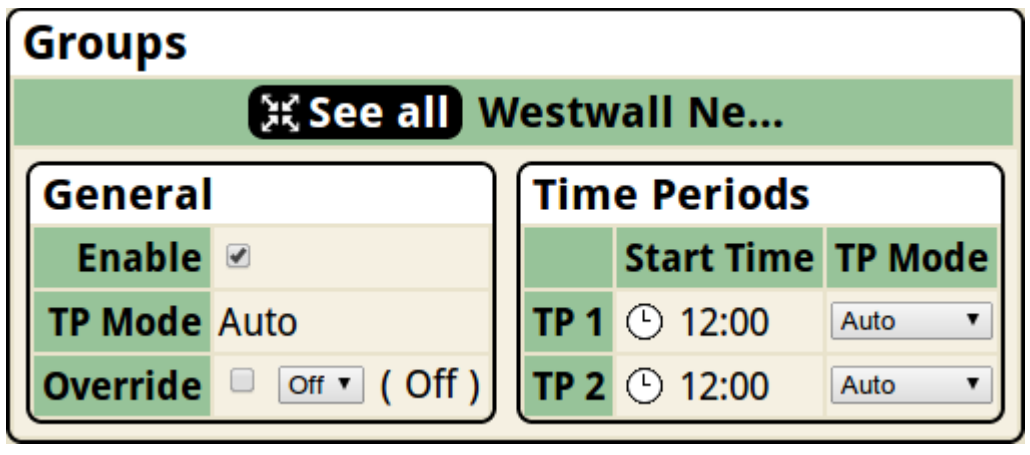
Fan Groups

When you have fangroups configured you will see them on the settings page near the bottom:



You can see the current **State** and **T[ime]P[eriod] Mode** for group and can enable or disable them using the **Enable** checkbox. Clicking on the expander button for each group (e.g. **Grp 1**) will allow you to see and set more options:

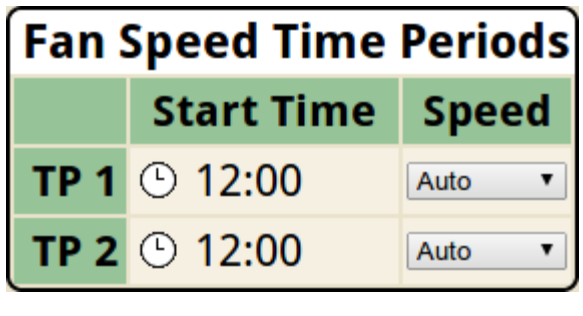


In this view you can **Enable** the group as before, see the **TP Mode** and force the fan "*Off*" or "*On*" by using the **Override** checkbox and dropdown. You can also set the mode for each each time period by choosing an option from the **TP Mode** dropdown box:

- **Auto:** the Multigrow controls the fan group
- **On:** the fan group is always on in this time period
- **Off:** the fan group is always off in this time period

Three Speed Fans

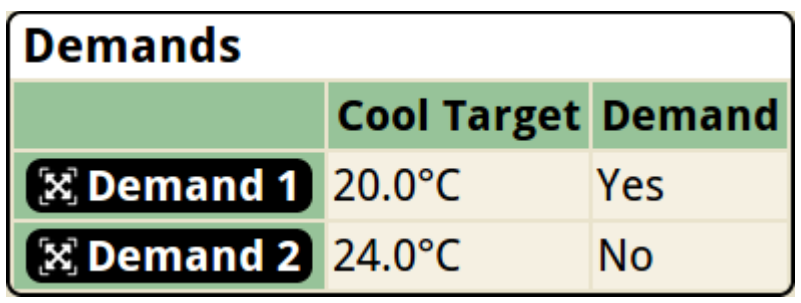
If you have three speed fans enabled, then instead of seeing the fan groups on the settings page you will instead see the following table:



This will allow you to set the fan speed depending on the current time period. The following options are available from the dropdown box:

- **Off:** fans are off during this time period
- **Auto:** let the Multigrow decide what speed to run the fans
- **Low:** fans are on low speed during this time period
- **Medium:** fans are on medium speed during this time period
- **High:** fans are on high speed during this time period

Demands



When you have enabled fan groups, there will be one demand for each fan group. When you have 3 speed fans, there will be one demand for each speed level no matter the amount of fans. In this example there are two fan groups, so there are two demands. Pushing on the expander buttons for each demand (**Demand 1** or **Demand 2**) will show further options.

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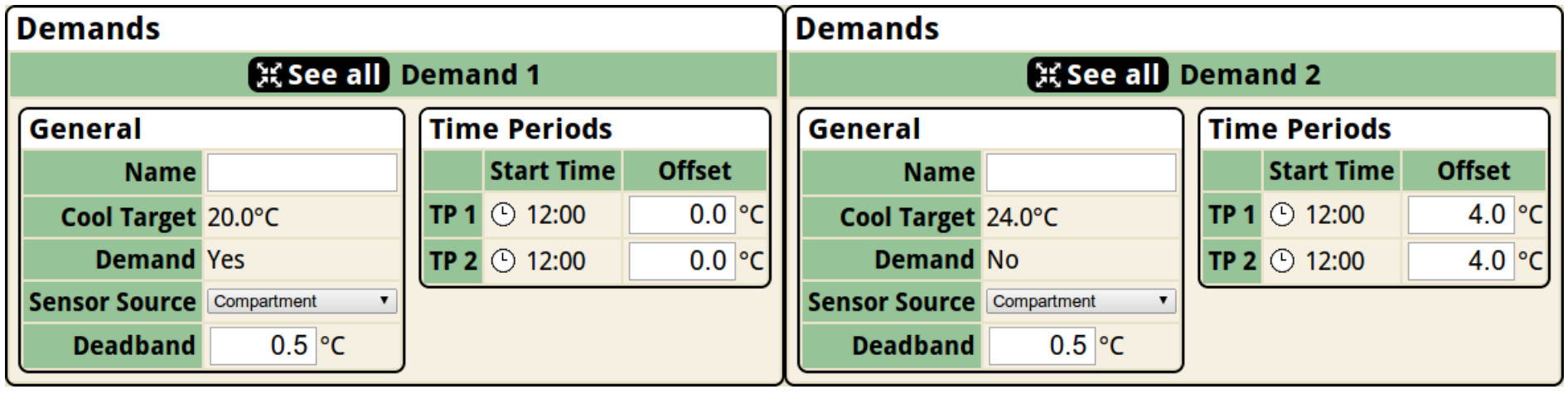
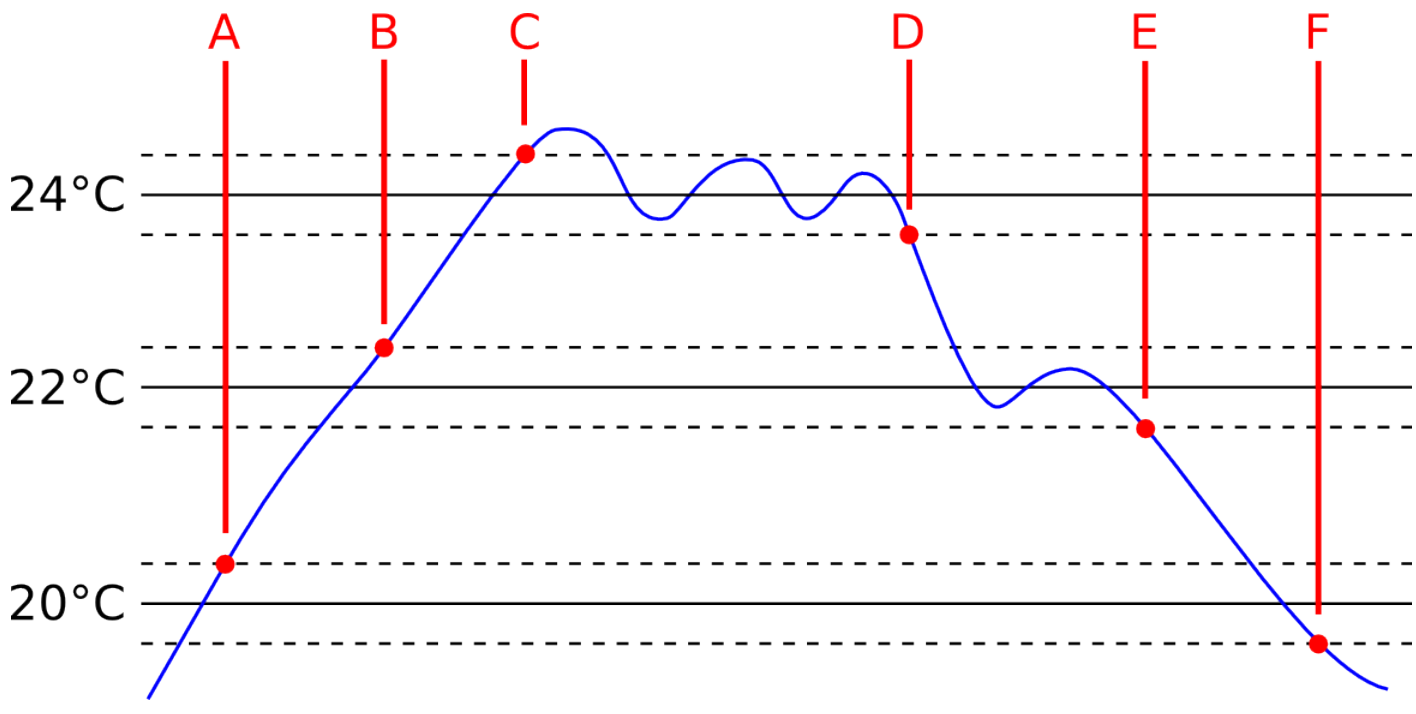


Field	Description
Name	Simply a name that is given to the demand
Cool Target	The cooling target for this demand, if the compartment temperature goes above this then the **Grp 1** fans will start (if enabled).
Demand	Is there a demand for fan cooling? If yes then the fans should be running
Deadband	The starting temperature deadband. With this configuration the **Grp 1** fans will not start until the temperature gets above 0.5°C and they will not turn off until the temperature gets below 19.5°C

You can also see the time period offsets specified for each demand. For **Demand 2** the **Offset** is set to 4°C so the **Cool Target** becomes the Compartment Cooling Target plus the **Offset** which is why the **Cool Target** for **Demand 2** is 24°C.

Resulting Behaviour



With the current settings we will have graduated stages of cooling, with fan group **Grp 1** turning on at 20.5°C (**A**), the Wet Wall turning on at 22.5°C (**B** - if the RH is less than 75%) and finally the fan group **Grp 2** turning on at 24.5°C (**C**). When the temperature comes back down **Grp 2** will turn off at 23.5°C (**D**), the Wet Wall will turn off at 21.5°C (**E** - unless the RH got above 90% already) and **Grp 1** will turn off at 19.5°C (**F**).

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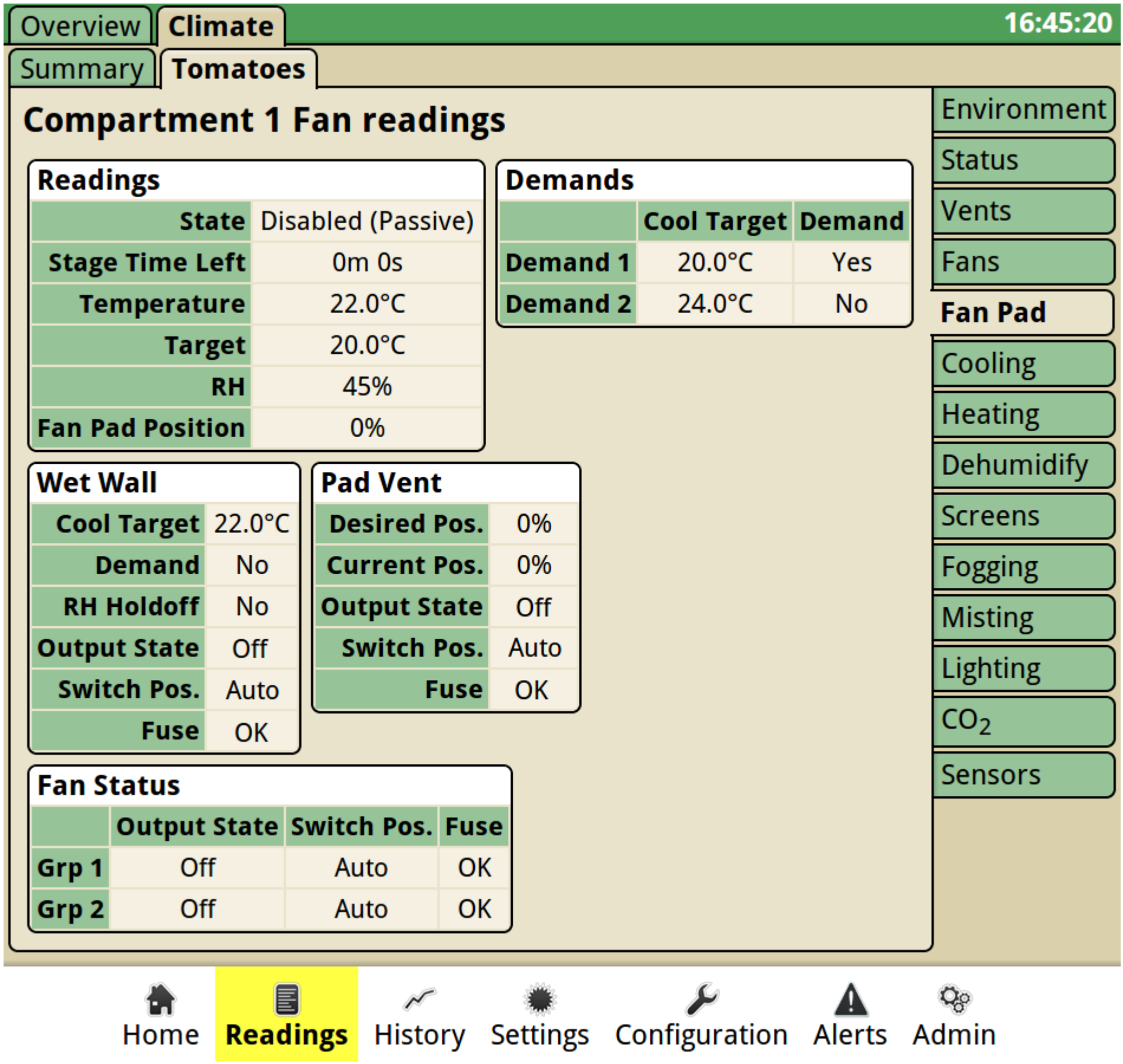
Readings

The readings page for the fan pad simply gives information about the devices that comprise the fan pad.



Cooling

The Multigrow can control simple on/off devices such as extraction fans, air conditioning units to provide extra cooling.

The first step to configuring coolers is to enable them by going to **Configuration > Climate > Summary** and ticking the checkbox labelled **Coolers Installed** for the compartment they are needed in. Once you have pushed the save button that appears you can go to **Configuration > Climate > Tomoatoes > Cooling** and push the **Add new** button to add a new cooler.

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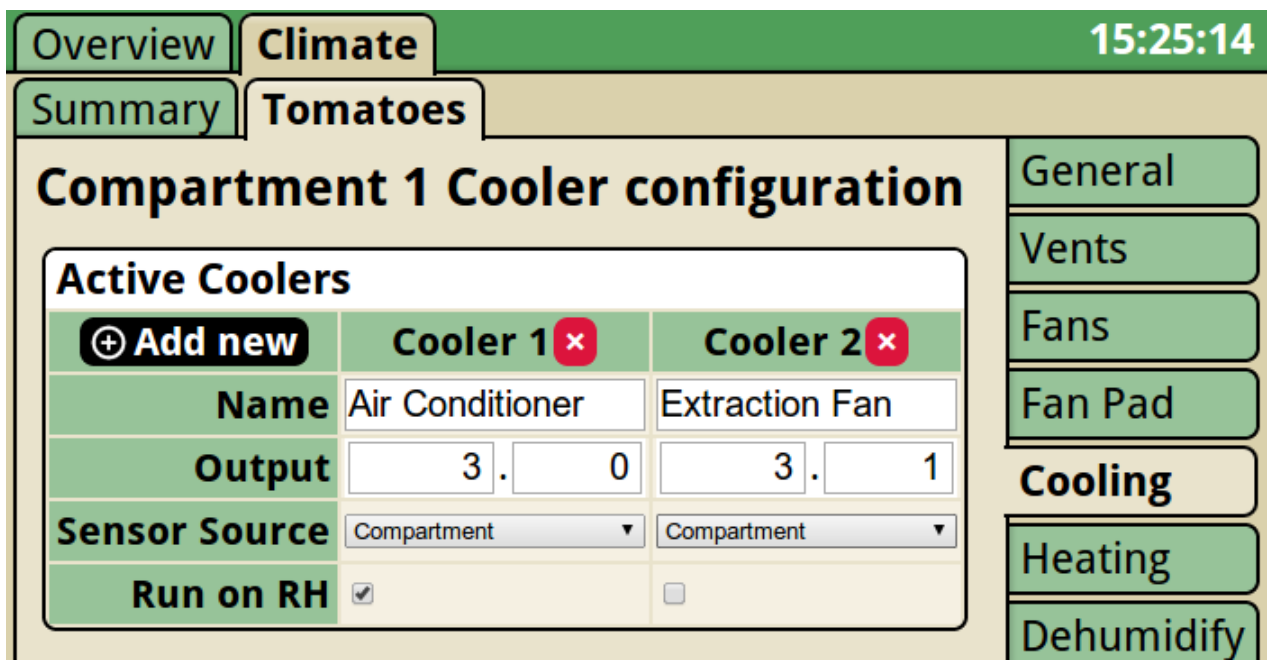
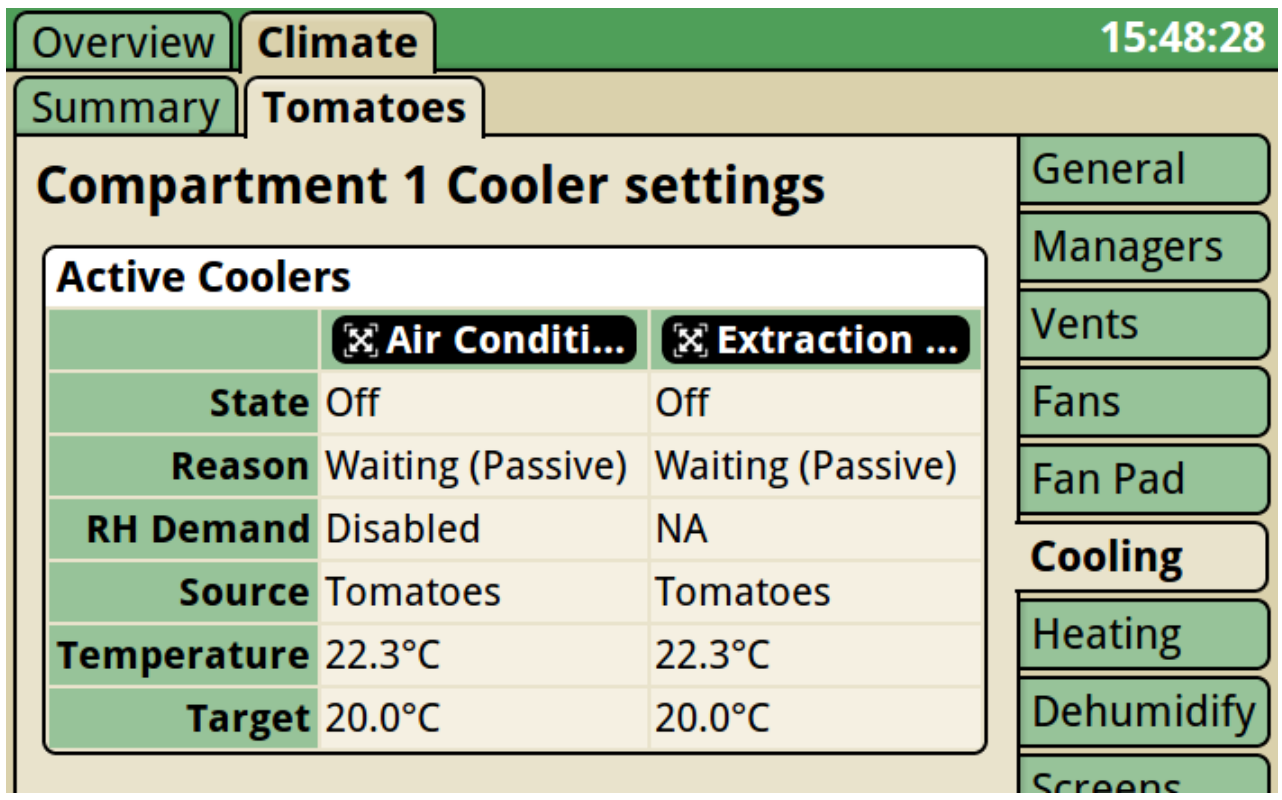


Enter the details for your coolers and push the **Save** button that appears. Each field is described below:

Field	Description
Name	The name for your cooler
Output	The output address your cooler is connected to
Sensor Source	• **Compartment:** use the compartment sensor • **Independent:** specify an independent sensor for this cooler to use
Runs on RH	This cooler dehumidifies as well (disabled when using **Independent Sensor Source**)

Now you will need setup the control options by navigating to **Settings** > **Climate** > **Tomatoes** > **Cooling**. You will see a table showing a summary of the current state and control:



Field	Description
State	Current state of the output
Reason	The reason for the current state
RH Demand	• **Disabled:** dehumidify options have not been set • **NA:** this cooler does not dehumidify
Source	The sensor source
Temperature	The current compartment temperature
Target	The target for this cooler

Pressing the expander button named **Air Conditi...** will make the control settings appear:

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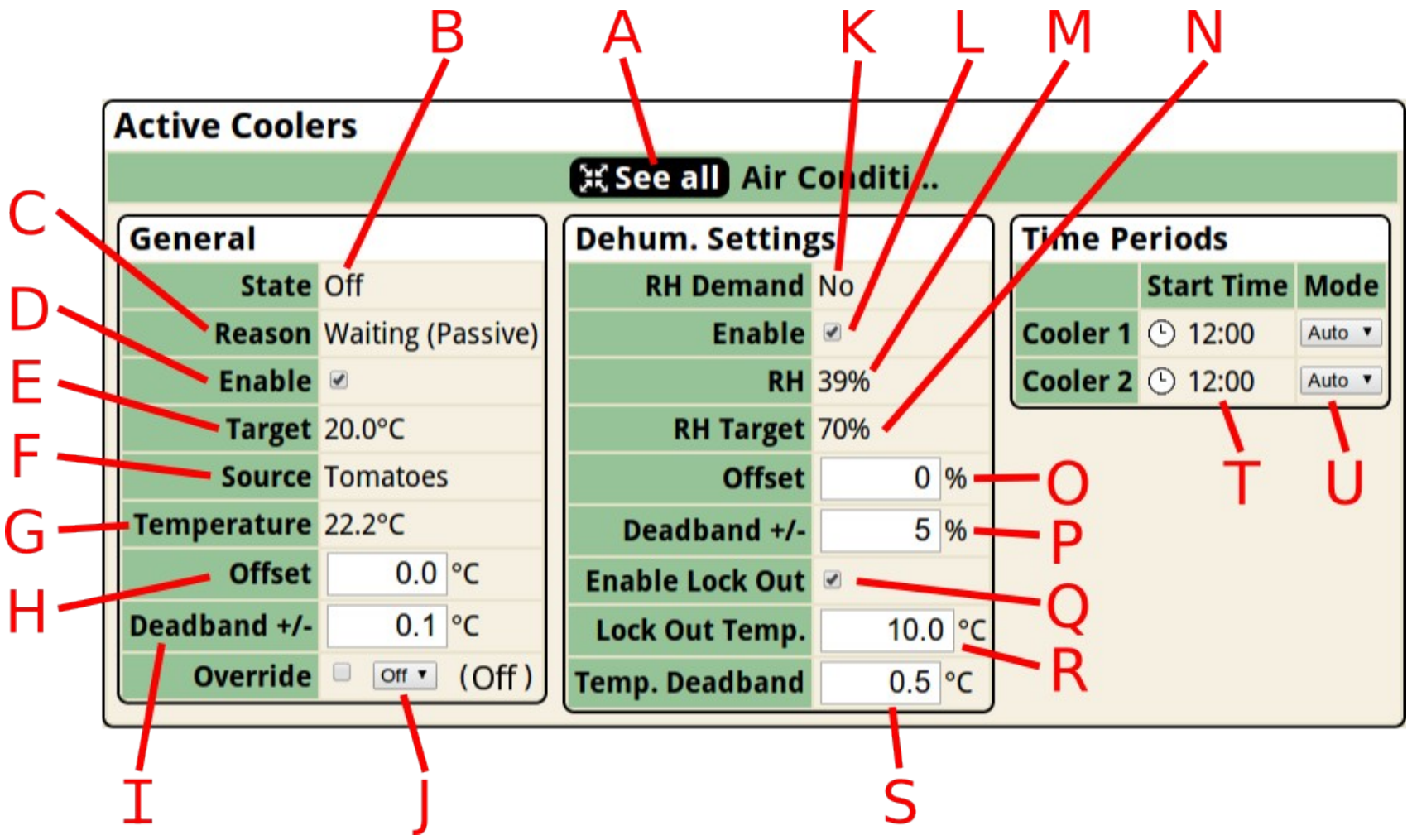

Annotation	Name	Description
A	**See All Button**	The opposite to the expander button this button acts as a collapser to show the settings summary for all the coolers
B	**State**	The current state of the cooler
C	**Reason**	The reason for the current state
D	**Enable Checkbox**	Enables or disables the cooler
E	**Target**	The target temperature for this cooler. Without an **Offset** being specified it will be equal to the compartment cooling target. When the compartment temperature exceeds this the cooler will activate
F	**Source**	The sensor source
G	**Temperature**	The current temperature in the compartment
H	**Offset**	The target offset for this cooler, setting this to "*2°C*" will cause the **Target** to change to *22°C*
I	**Deadband**	Using the current setting of "*0.1°C*", the cooler will turn on at 20.1°C and turn off at 19.9°C. Widening the deadband will prevent your coolers from turning off and on too quickly
J	**Override**	Ticking the checkbox allows you to force the cooler to be "*Off*" or "*On*" using the dropdown box. The current state is shown in brackets
K	**RH Demand**	Is there a demand for dehumidifying right now?
L	**Enable checkbox**	Enables using this cooler for dehumidification
M	**RH**	The current humidity
N	**RH Target**	The target RH for this cooler. Without an **Offset** being specified this will be same as the compartment RH target. When the compartment RH exceeds this the cooler will activate
O	**Offset**	The RH Offset, changing this will increase the **RH Target**
P	**Deadband**	The RH deadband. With the current settings the cooler will activate at 75% and deactivate at 65%
Q	**Enable Lock Out Checkbox**	When enabled, stops the cooler activating from RH Demand if the compartment temperature is less than the **Lock Out Temp.** value specified.
R	**Lock Out Temp.**	When **Enable Lock Out** is enabled, the cooler will not activate from RH Demand if the compartment temperature is lower than this
S	**Temp Deadband**	If **Enable Lock Out** is enabled, and the cooler is active due to RH demand, the deadband will stop the cooler turning off and on too quickly. With the current settings, the cooler will turn off at 9.5°C and turn back on at 10.5°C
T	**Start Time**	When the Time Period starts
U	**Mode**	Set the mode of this cooler in the Time Period. • **Auto:** The Multigrow controls cooler activation • **On:** the cooler is always on during this time period • **Off:** the cooler is always off during this time period

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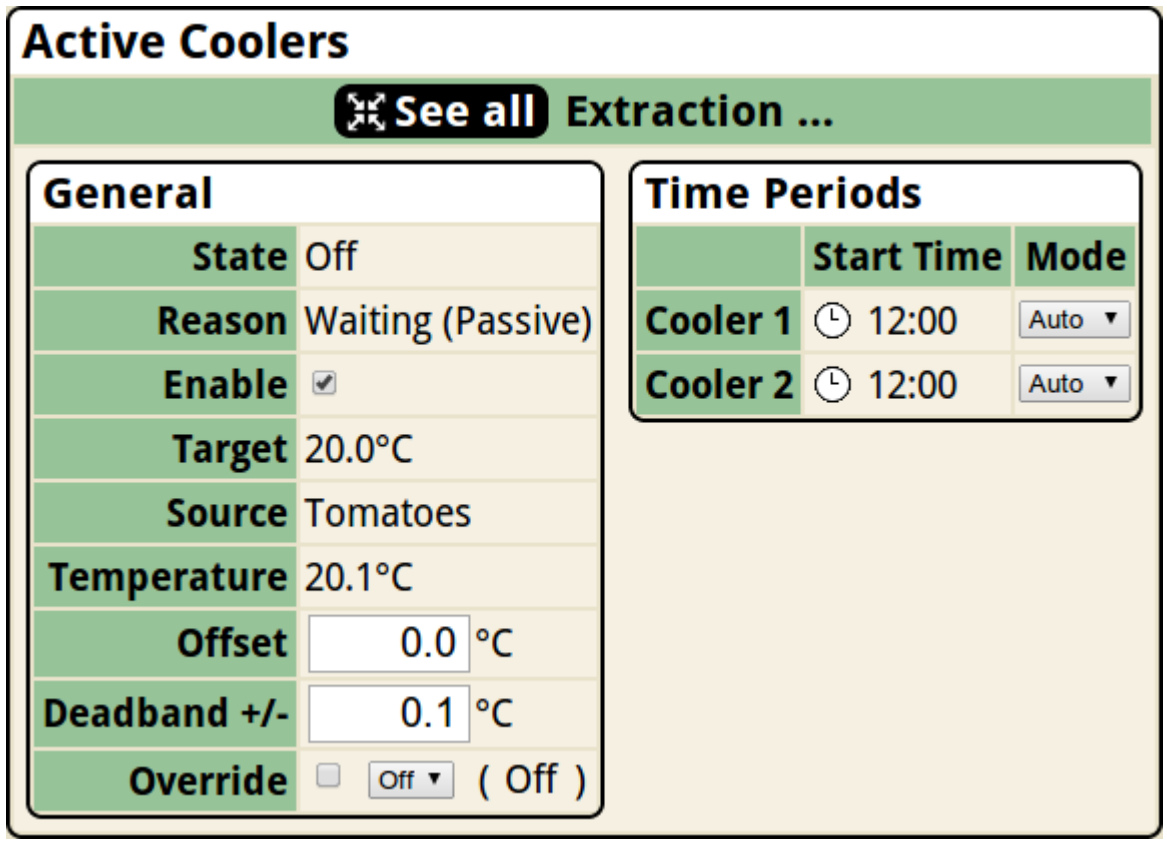
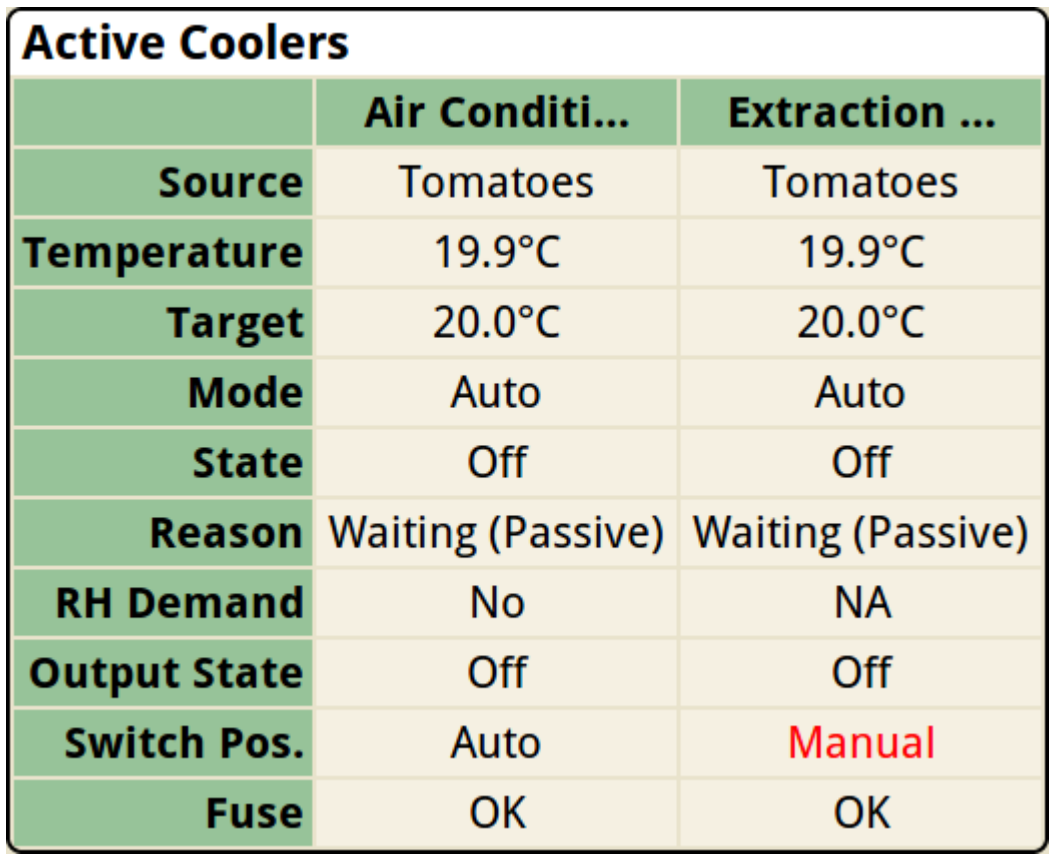
It should be noted that when you configure a cooler not to **Run on RH**, the dehumidifier section above will be absent, for instance:



The readings page for coolers can be seen by navigating to **Readings > Climate > Tomatoes > Cooling** and shows some basic information about the status of each cooler:



Heating

The Multigrow can control any kind of simple on/off heater as well as fan heaters. If the temperatures drops below the specified heating target it will automatically turn on the heaters as needed to get the temperature back within range.

To allow the Multigrow to control heaters, navigate to **Configuration > Climate > Summary** and make sure that the checkbox labelled **Heaters Installed** is ticked for the compartments you wish to use the heaters in. Press the **Save** button that appears then navigate to **Configuration > Climate > Tomatoes > Heating** to start configuring your heaters.

The on/off heaters configuration is pretty simple:

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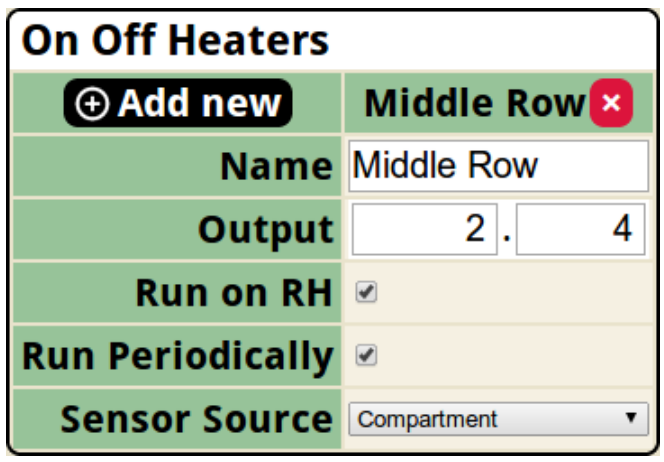
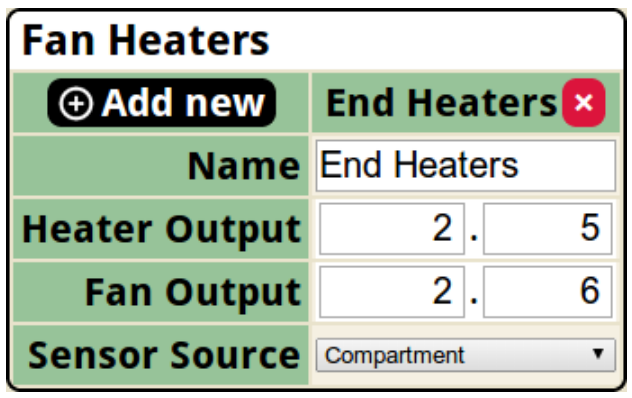


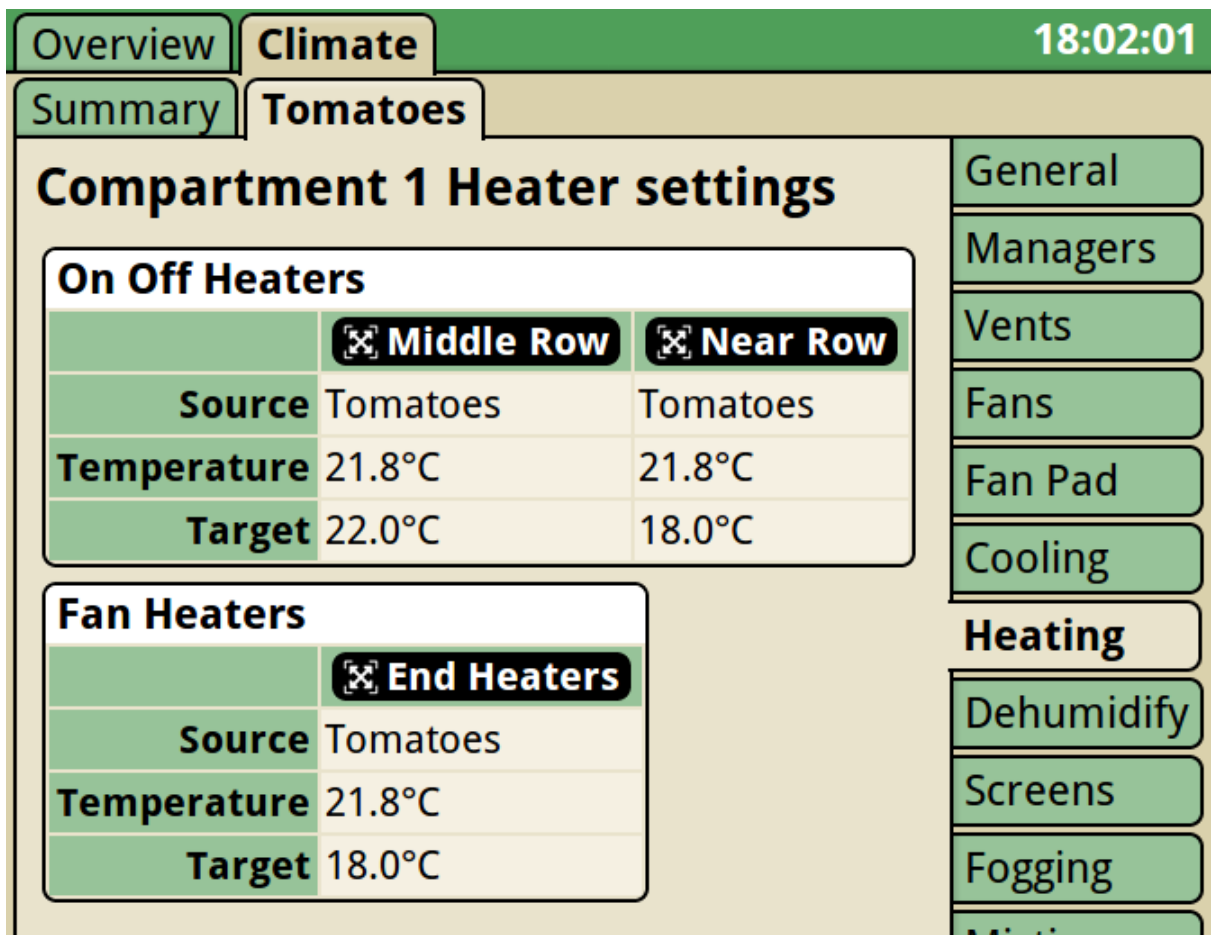
Field	Description
Name	A name to give your heaters
Output	The output address for the heater(s)
Run on RH	This heater should act like a dehumidifier as well
Run Periodically	Allow this heater to run on a periodic schedule
Sensor Source	The sensor this heater will use to make decisions about control

The fan heater configuration is similarly simple:



Field	Description
Name	A name for your fan heaters
Heater Output	The output address for the heater
Fan Output	The output address for the fan
Sensor Source	The sensor this fan heater will use to make decisions about control

Navigating to **Settings > Climate > Tomatoes > Heating** will display some basic readings about the heaters.



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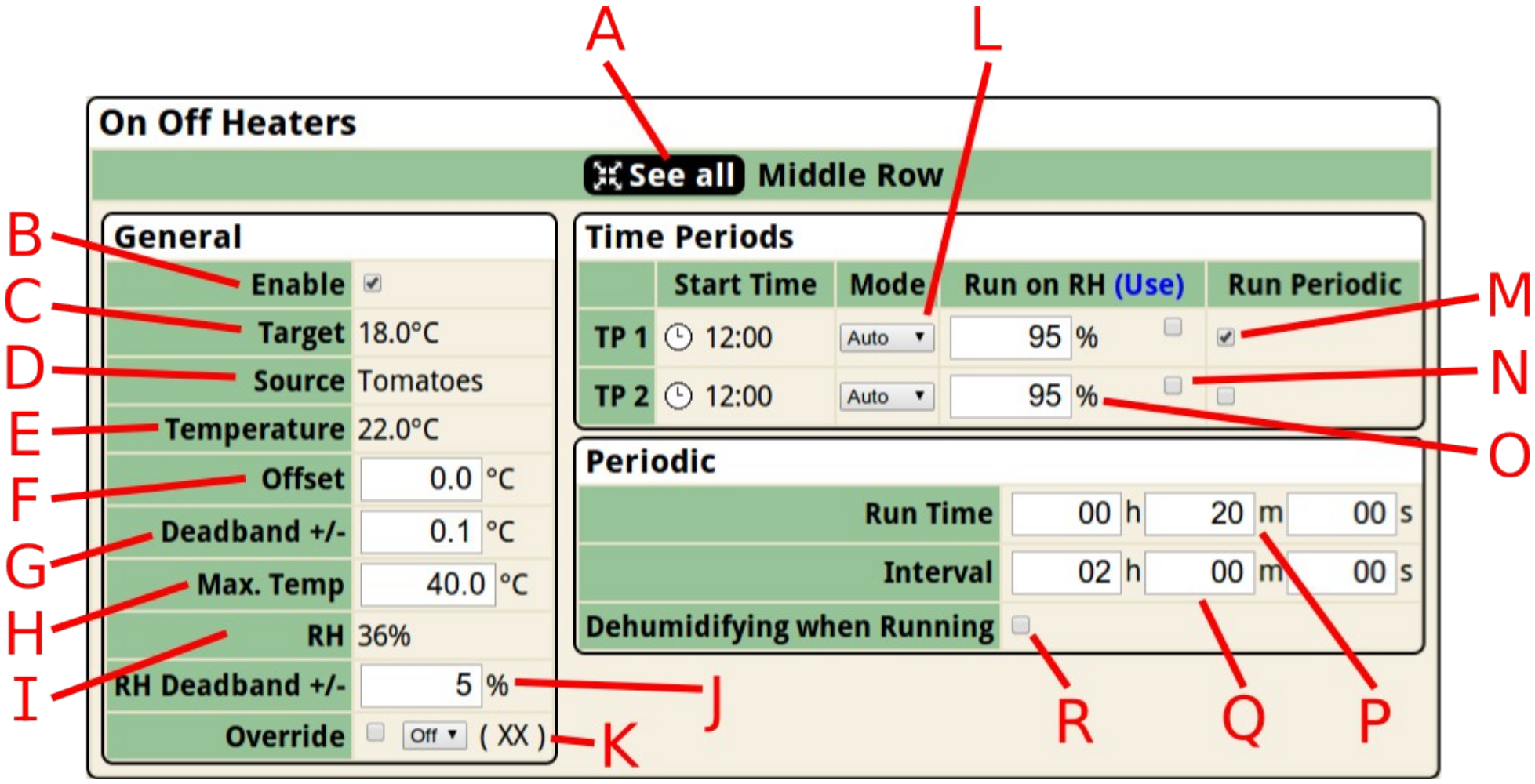
To change the control settings press one of the expander buttons:



Annotation	Name	Description
A	**See All Button**	Collapses the view so that all heaters are visible
B	**Enable Checkbox**	Enables the heater when ticked
C	**Target**	The heating target, heaters will activate when the temperature goes below this (Compartment target + **Offset**)
D	**Source**	The sensor source
E	**Temperature**	The current temperature in the compartment
F	**Offset**	
G	**Deadband**	
H	**Max. Temp**	Don't let the compartment get above this temperature
I	**RH**	The current relative humidity in the compartment
J	**RH Deadband**	
K	**Override**	
L	**TP Mode**	
M	**Run Periodic**	Run periodically when inside this time period
N	**Run on RH**	Run if the RH gets above the specified percentage
O	**RH Limit**	
P	**Run Time**	When run periodic is enabled this is how long the heater will run for
Q	**Interval**	When run periodic is enabled this is how long to wait between running the heater
R	**Dehumidifying when Running**	Tells the Multigrow that when this heater is running it is dehumidifying

To setup the control options for the fan heaters press the expander button (in this case the one labelled **End Heaters**) and this screen will appear:

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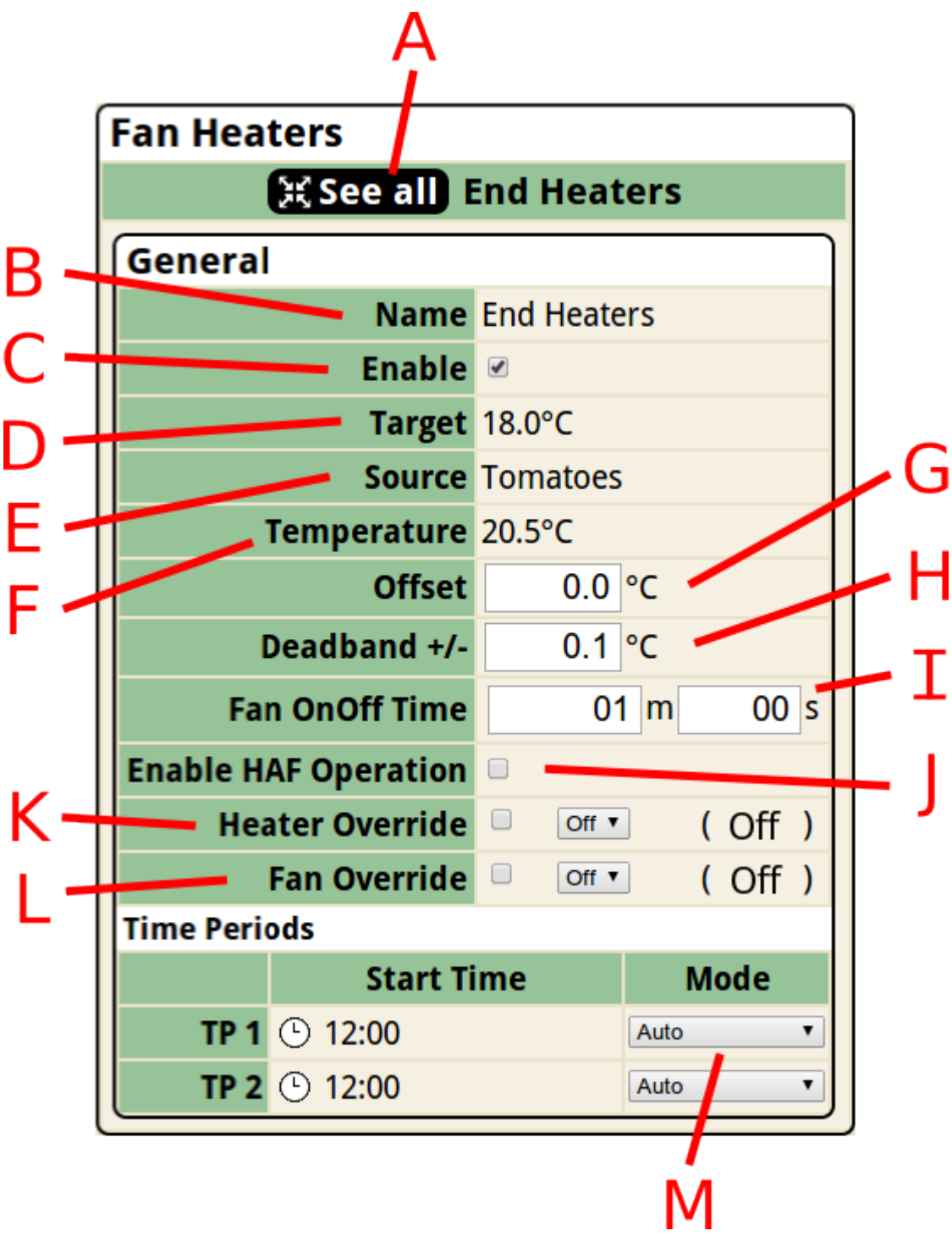

Annotation	Name	Description
A	**See all button**	Collapses the settings screen for this fanheater to show all fanheaters
B	**Name**	The name of this fan heater
C	**Enable checkbox**	Enables this fanheater
D	**Target**	The target temperature at which the fanheater will turn on
E	**Source**	The sensor source
F	**Temperature**	The current temperature of the compartment
G	**Offset**	The target offset
H	**Deadband**	The target deadband (fanheater would turn on at Target+Deadband and off at Target-Deadband
I	**Fan OnOff Time**	Sets how long to wait after turning the fan off before turning it back on
J	**Enable HAF Operation**	Enables using the fan for circulation
K	**Heater Override**	Allows overriding the heater to on or off
L	**Fan Override**	Allows overriding the fan to on or off
M	**TP Mode**	Allows overriding the fan heater to on or off during a specific time period, while Auto lets the Multigrow decide the state

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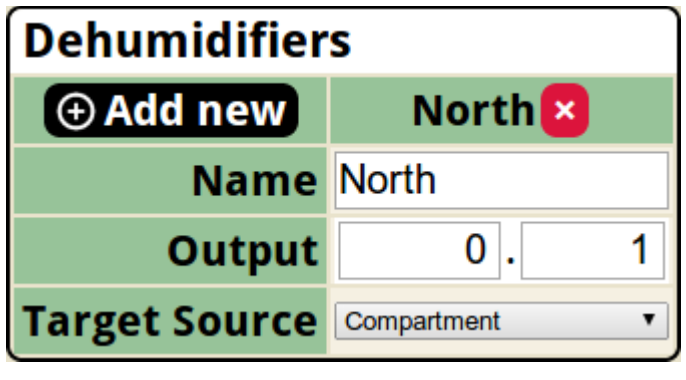
Dehumidify

Configuration

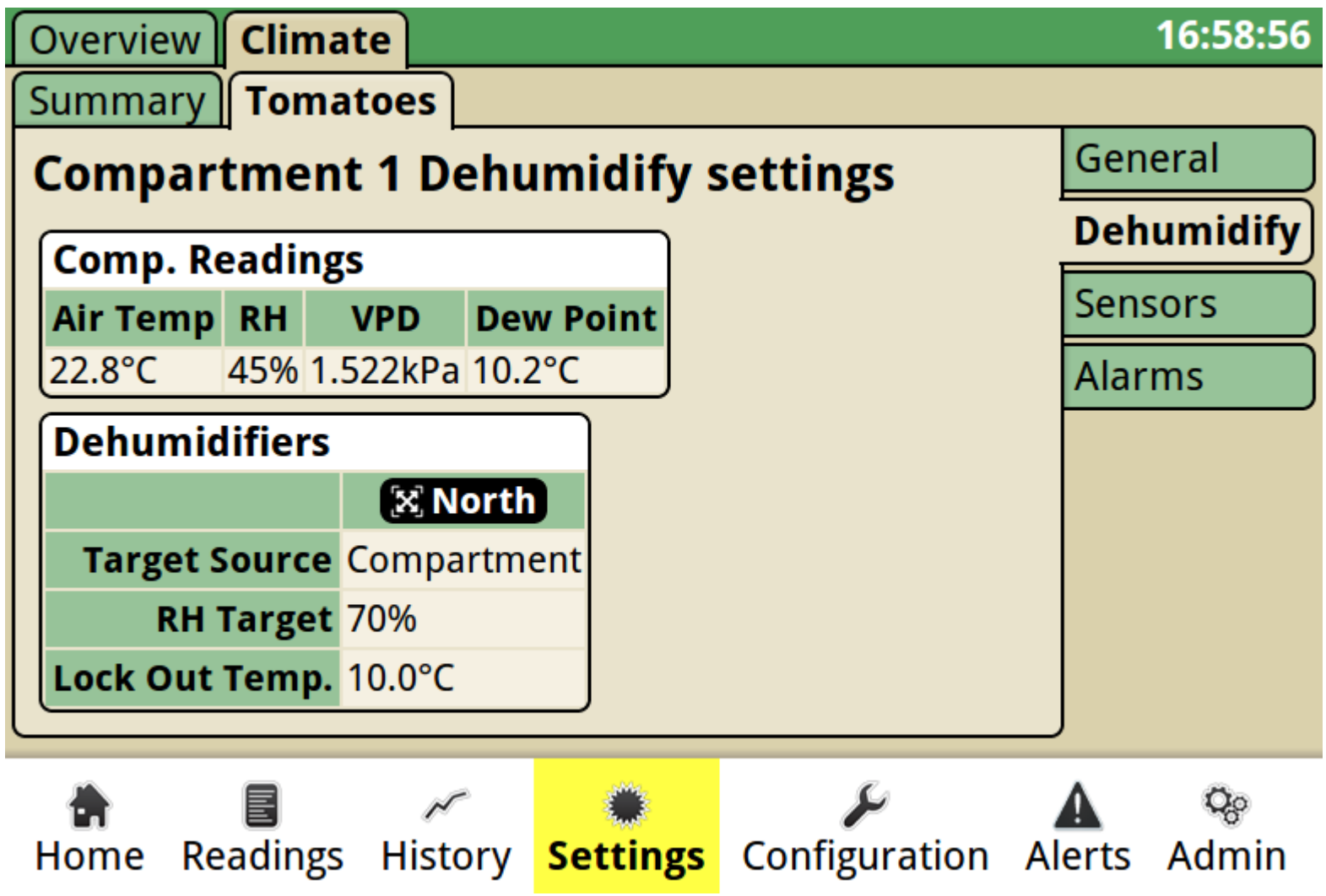
Dehumidifiers can be configured by navigating to **Configuration > Climate > Summary** and ticking the checkbox labelled **Dehumidifiers Installed** for the relevant compartments. Once you press the **Save** button that appears, navigate to **Configuration > Climate > Tomatoes > Dehumidify** and press the **Add new** button to add a new Dehumdifier:



Give it a **Name** and specify the **Output** address. You can also set the **Target Source** to get it's readings from an independent sensor if needed.

Settings

To setup the control options navigate to **Settings > Climate > Tomatoes > Dehumidify** where you will see a summary of the settings, with the current readings.



Press the expander button under the Dehumidifiers section to adjust the control options:

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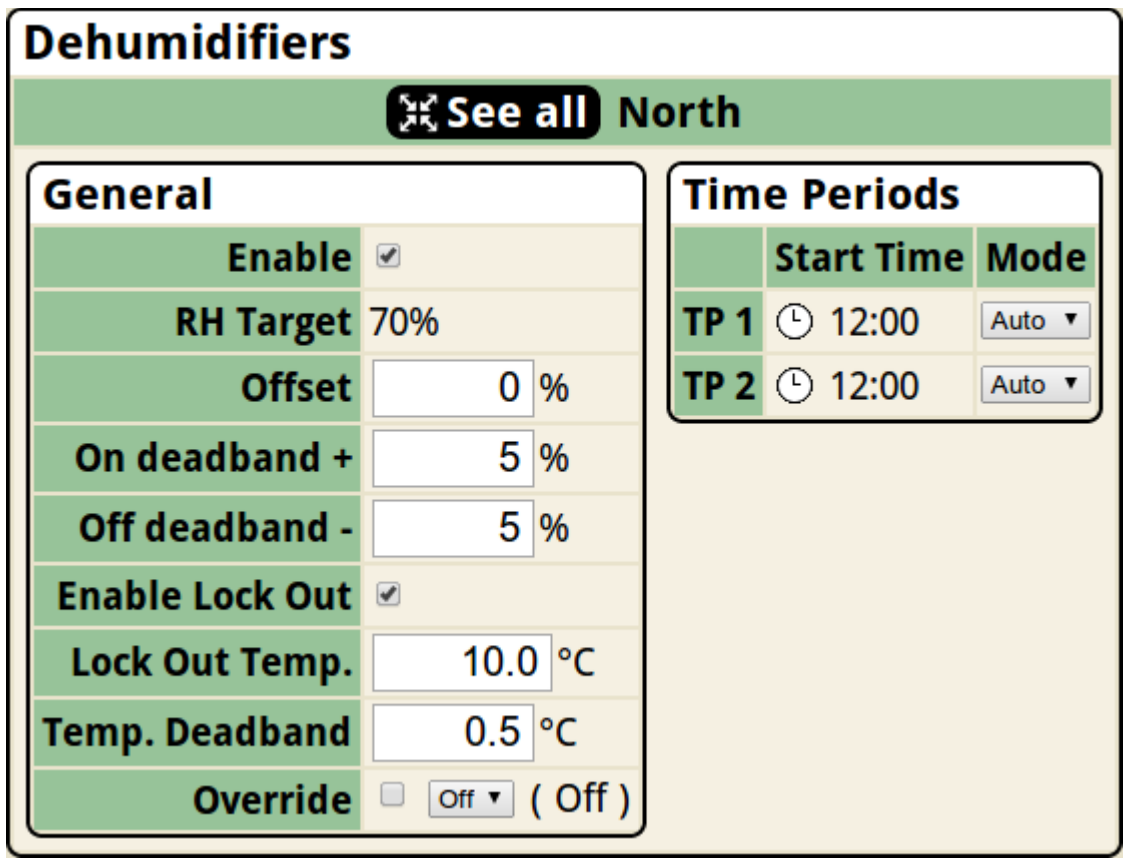

Field	Description
Enable	When ticked, the dehumidifier will be enabled
RH Target	The RH target that this dehumidifier will try to reach. Above the target this dehumidifier will run, and below it will turn off (deadband allowing)
Offset	Offset the compartment RH target by this value, to set the **RH Target** that this dehumidifier will try to keep
On Deadband +	Sets the upper deadband limit, causing the dehumidifier to turn on above **RH Target** + **On Deadband +**
Off Deadband -	Sets the lower deadband limit, causing the dehumidifier to turn off below **RH Target** - **Off Deadband -**
Enable Lock Out	Enables temperature lockout to stop the dehumidifier if the temperature goes below a certain level
Lock Out Temp	The temperature at which to stop dehumidifying
Temp Deadband	The temperature deadband for the for the **Lock Out Temp** - stops the dehumidifier turning off and on too much if the temperature is hovering around the **Lock Out Temp**
Override	Override the dehumidifier to "*Off*" or "*On*"

> Some dehumidifiers can't dehumidify below a certain temperature (usually about 18°C). You will need to check the operating temperature range for your dehumidifier to set the **Lock Out temp** value. If you don't set this value your dehumidifier may fail to be effective, wasting energy.

Readings

The readings page simply shows a summary of all the dehumidifiers and their current status:

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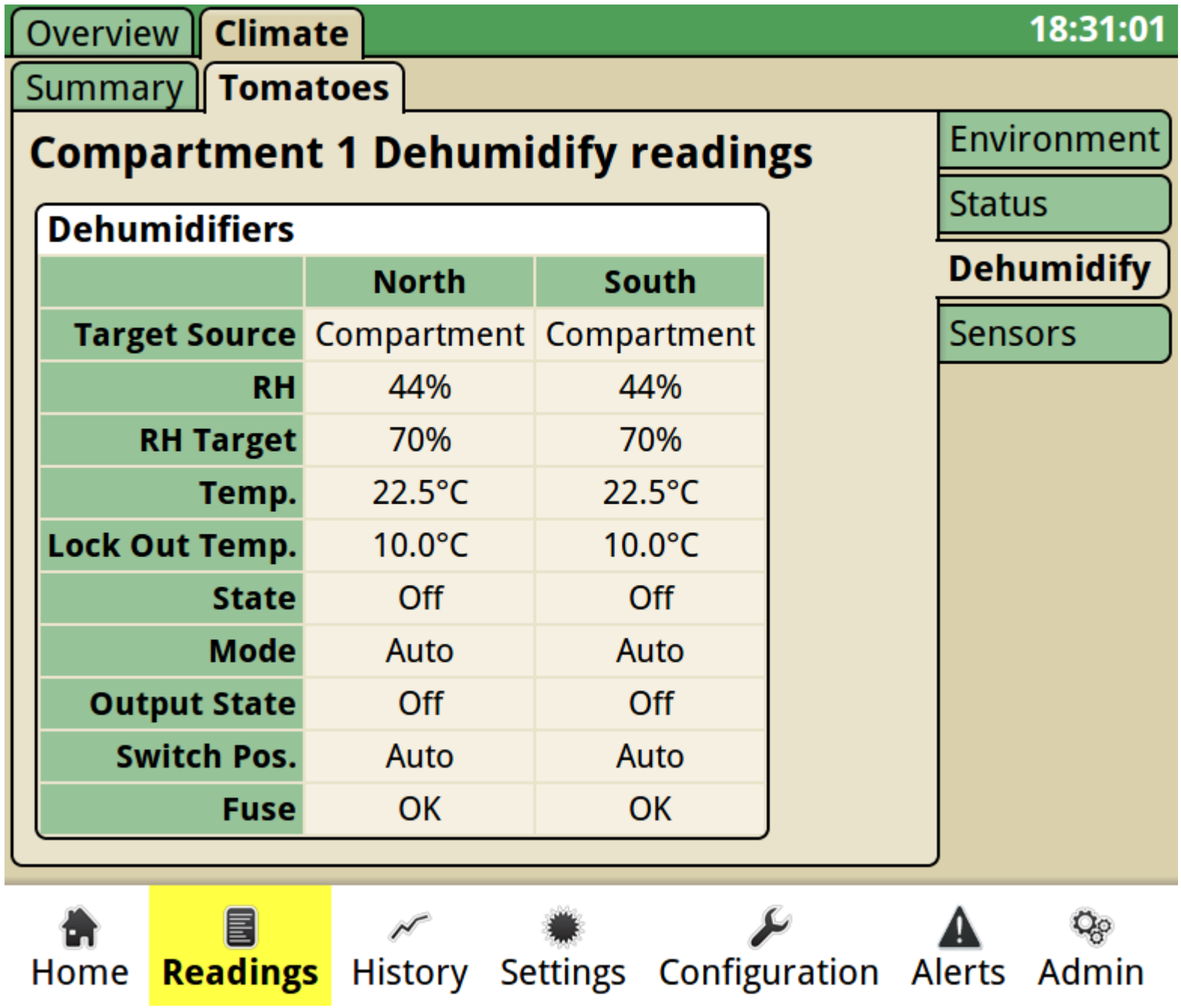

Field	Description
Target Source	The source of the sensor that drives the dehumidifier, *Compartment* or *Independent*
RH	The current RH as read by the sensor
RH Target	The target that this dehumidifier will try to keep
Temp	The current temperature as read by the sensor
Lock Out Temp.	The temperature that when reached, will stop the dehumidifier
State	The current state of the dehumidifier, *On* or *Off*
Mode	The current mode of the dehumidifier, *Auto* means that the **State** is driven by the Multigrow while *User* means that the **State** is due to the **Override** option in the settings
Output State	Current state of the output, *On* or *Off*
Switch Pos.	The current switch position of the output on the Output Module, *Auto* or *Manual*
Fuse	The fuse status of the Output Module

Screens

In order for the screens to work properly there needs to be a weather station configured in the system. See the section titled *Weather* for more information.

Configuration

To configure screens on your Multigrow the first step is to navigate to **Configuration > Climate > Summary** and tick the checkbox labelled **Screens Installed** for the relevant compartments. After pushing the **Save** button that appears, navigate to **Configuration > Climate > Tomatoes > Screens** and push the **Add new** button to add a new screen.

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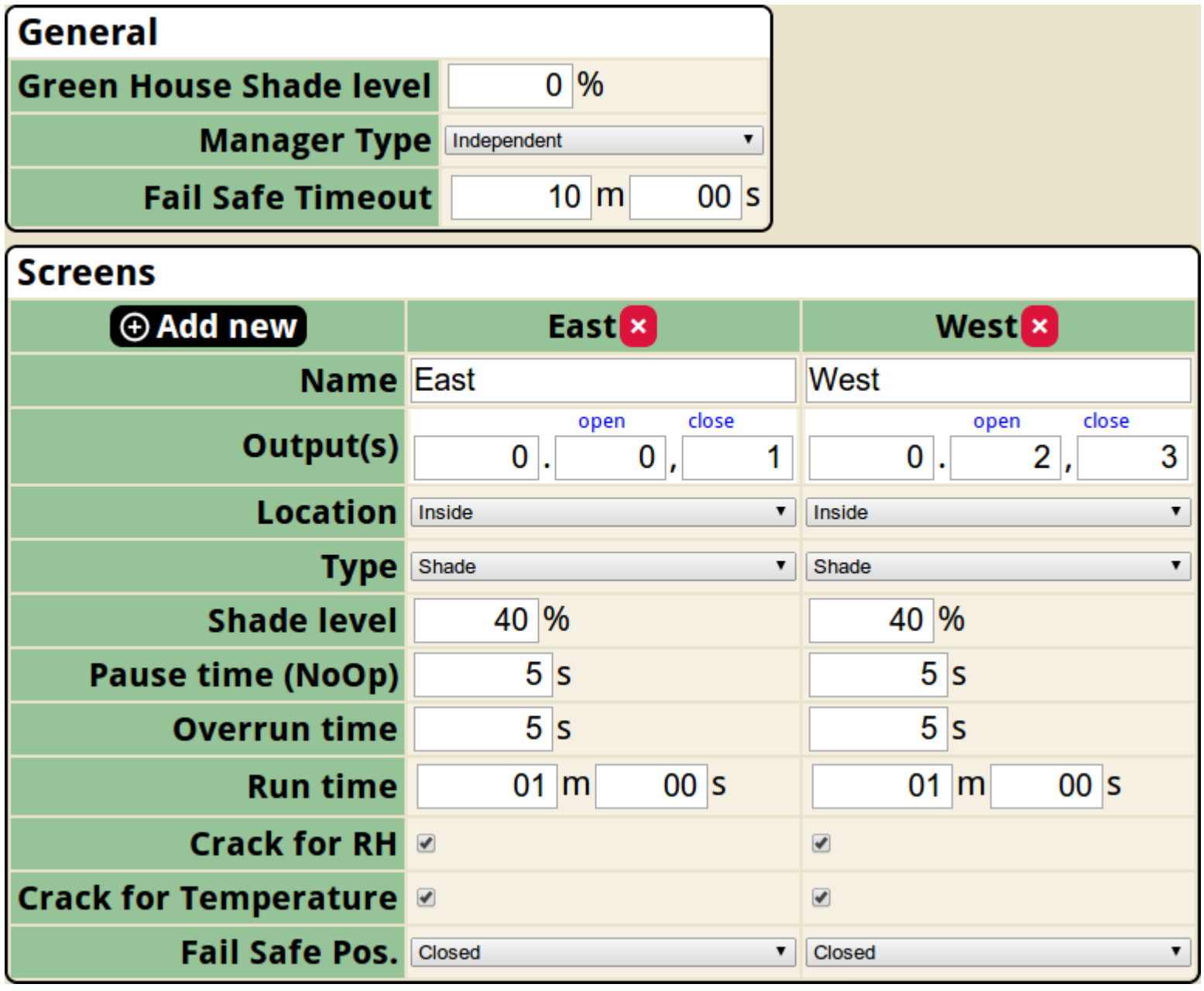


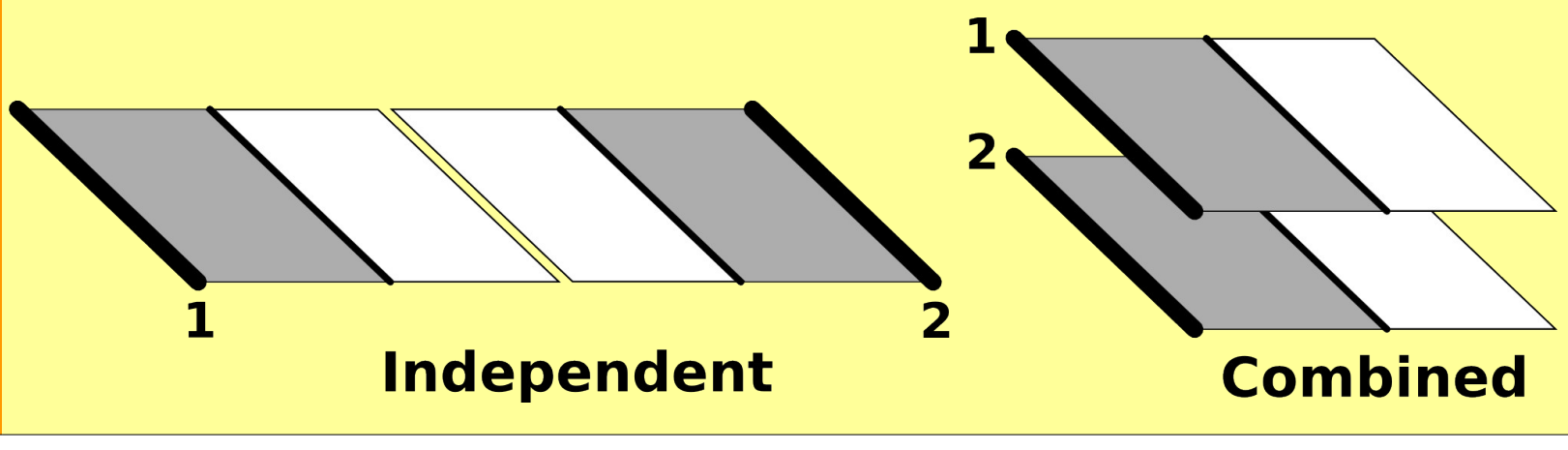
General

You need to configure some general configuration settings for the screens:

Field	Description
Green House Shade level	The shade percentage of the greenhouse itself (e.g. for plastic greenhouses this would be approx 20%)
Manager Type	The way the shades are managed, one of: • **Independent:** shades are managed independently of each other with settings for each • **Combined:** shades are managed intelligently by the Multigrow, one group of settings for all shades
Fail Safe Timeout	If the solar reading is lost, wait this long before sending the screens to the fail safe position

Which manager type to use?

The **Independent** Manager should be used if there is a single screen, or if the screens are not layered. The **Combined** Manager should be used if the screens are layered over top of each other.



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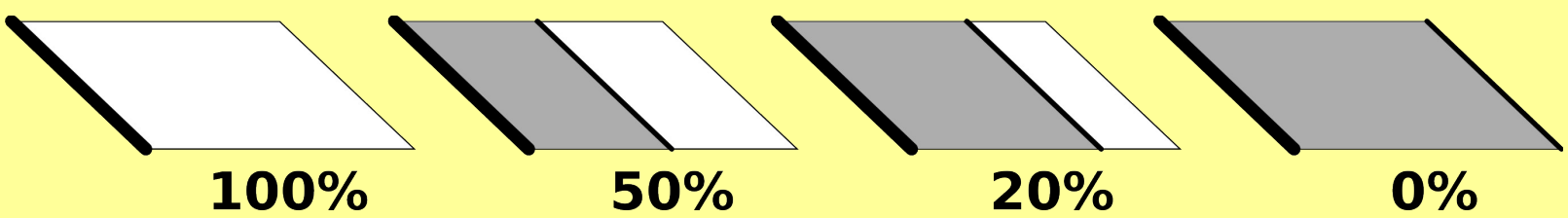
Screens

This is where you add the individual screens, configure their options and output addresses.

Field	Description
Name	The name of the screen
Output(s)	The output addresses for the screen
Location	The location of the screen, one of: • **Inside:** the screen is inside the greenhouse • **Outside:** the screen is outside the greenhouse
Type	The type of screen, one of: • **Shade:** a simple shade cloth • **Energy:** a screen that will trap heat • **Shade+Energy:** a screen that will shade and trap heat • **Blackout:** a screen that blocks the sun to make the plants think it is night time
Shade level	How much shade this screen provides
Pause time (NoOp)	How long to wait between running the screen motors backwards and forwards
Overrun time	How long to keep running after the **Run Time** duration to ensure that the limit switch has been hit
Run time	The time it takes to run the screens from 0% to 100%
Crack for RH	Crack the screens to let humidity out if the RH is over target
Crack for Temperature	Crack the screens to let hot air out if the air temperature is over target
Fail Safe Pos	The fail safe position of the screens, one of: • **Closed** • **Open**

Settings

The screen position is measured as a percentage of how open the screen is. 0% means that the screen is fully closed, while 100% means the screen is fully open:



In some places the screens are referenced as being a percentage covered. In this case the above images would be inverse (e.g. in order left to right: 0% covered, 50% covered, 80% covered, 100% covered)

Once you have configured your screens you can adjust the control options by navigating to **Settings > Climate > Tomatoes > Screens**.

Shade Manager (Independent)

The shade manager manages the screens to ensure there is enough shade as per the control settings. This is how it operates when in independent mode.

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Shade Manager

	Decrease Cover		Increase Cover	
East	Solar Level below	200 W/m²	Solar Level above	600 W/m²
	For at least	01 m 00 s	For at least	01 m 00 s
	Demand	Yes	Demand	No
	Time until Decrease	0m 0s	Increase in Solar needed	600W/m²
West	Solar Level below	200 W/m²	Solar Level above	600 W/m²
	For at least	01 m 00 s	For at least	01 m 00 s
	Demand	Yes	Demand	No
	Time until Decrease	0m 0s	Increase in Solar needed	600W/m²

There are two conditions that the shade manager checks for a demand in, increasing cover and decreasing cover.

Increase Cover

The shade manager will check if the Solar RAD reading is above the value specified in the **Solar Level above** field. If that condition is met, then it will wait until the reading has been above that value for the time specified in the **For at least** field. The **Demand** field shows if there is currently a demand for an increase in cover.

When the Solar RAD reading is below the limit specified in **Solar Level above** then the last field will be **Increase in Solar needed** and shows how much the Solar RAD reading needs to increase by to trigger the increase timer. When the Solar RAD is above the limit specified in **Solar Level above**, the last field will change to **Time until Increase** and will countdown from the **For at least** field. When it hits 0, then the Shade Manager will increase the cover.

Decrease Cover

When determining if the cover needs to be decreased the shade manager basically does the inverse of the calculation for increasing the cover. The **Solar Level below** field determines the level which the Solar RAD reading should fall below before saying that a decrease in cover is needed. The **For at least** field controls how long the Solar RAD reading should be below the limit before actually decreasing the cover (and saying that Yes, there is **Demand**).

The last field changes depending on the conditions. It will show how far the Solar RAD reading needs to fall in the **Decrease in Solar needed** field until the value falls below. At which time the field will change to **Time until Decrease** and the timer will start counting down. Once it hits 0 the cover will be decreased.

Shade Manager (Combined)

When the **Manager Type** is set to combined in the screens configuration the Shade Manager acts somewhat more autonomously.

Shade Manager

Decrease Cover	Solar Level below	For at least
	200 W/m²	01 m 00 s
Increase Cover	Solar Level above	For at least
	600 W/m²	01 m 00 s

Combinations

Best Combo.	3 (3)
Change Combo.	Change Now
Enable Auto Change	☐
Change After	30 m 00 s

You only need to set the **Solar Level** and **For at least** fields, which act the same as with the **Independent** manager except you don't need to enter it for each screen. The Shade Manager will adjust the screens intelligently to keep the Solar RAD readings consistent within the compartments.

Combinations

How it works is that the Shade Manager will create a number of combinations of screen positions and use whichever is best depending on the conditions.

Name	Description
Best Combo	The best combination for the current conditions
Change	Tells the Shade Manager to detect the best combination for the current conditions and change to it

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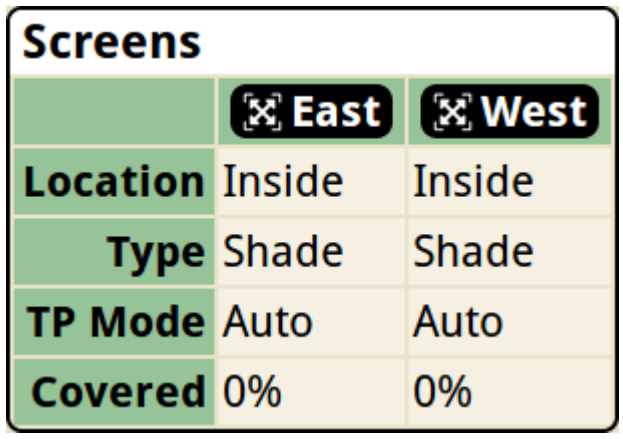
Name	Description
Combo	
Enable Auto Change	Normally the shade manager will only change the combination when the light level changes. Ticking this checkbox will make re-evaluate the conditions to find the best combination and change to it every time period specified in the **Change After** field
Change After	When the **Enable Auto Change** checkbox is ticked this field specifies the how often the auto change should occur

Each combination can be viewed on the readings page.

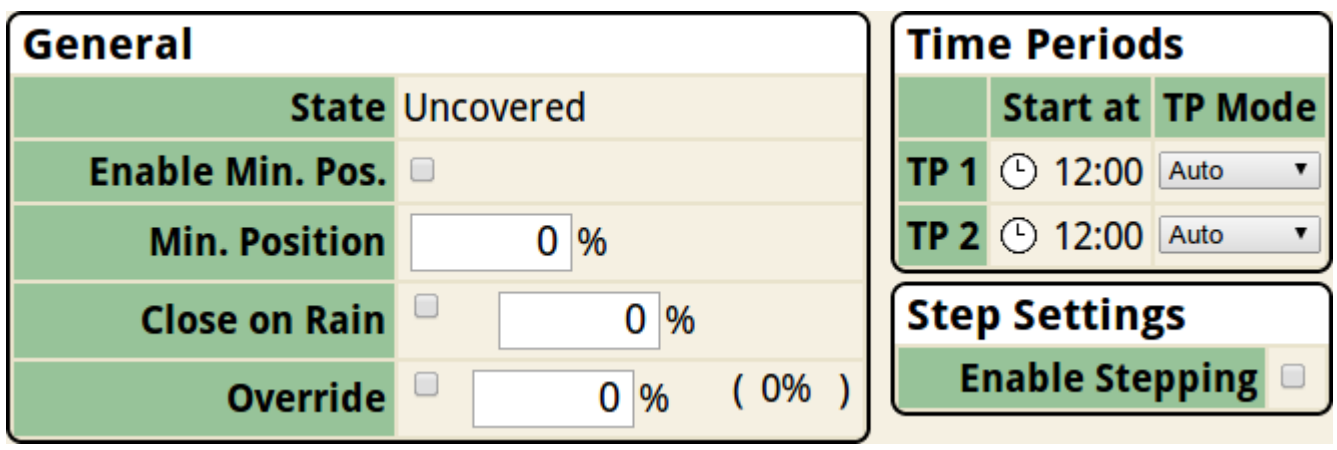
Screens

The screens table shows some basic information about the screens:



When you click on the expander button for a screen you will see some control options:

General



Field	Description
State	The current state of the screen
Enable Min Pos	When ticked the screen will never go to less than the percentage specified in **Min Position**
Min Position	Don't let the screen go to less that this (if the **Enable Min Pos** checkbox is ticked)
Close on Rain	When ticked, the screen will go to the percent specified
Override	Override the screen to the position specified
Enable Stepping	Prevent thermal shock to the plants by opening the screen in steps if the temperature inside and outside is quite different

Crack for Temperature

> This section will only appear when the **Crack for Temp** checkbox is ticked in the configuration section for the screen

If the screens are trapping temperature too effectively the air temperature may become too hot. To let some of this hot air out it is possible to crack the screens once the temperature reaches a certain value.

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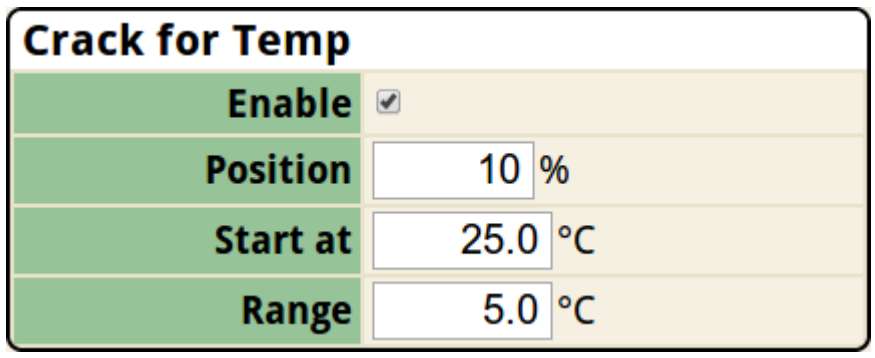
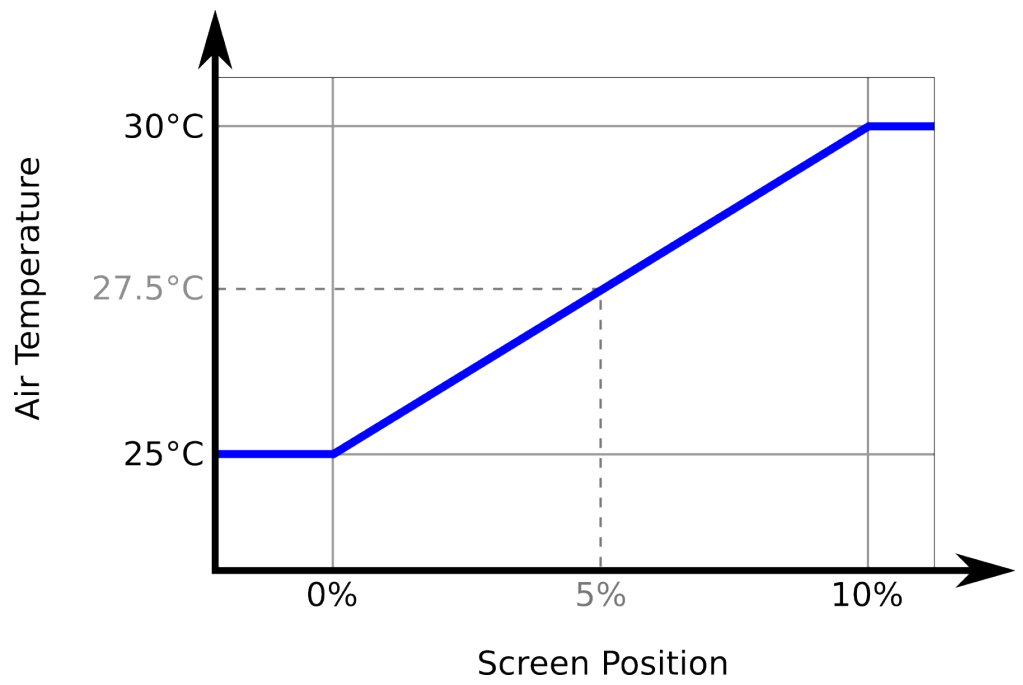


Field	Description
Enable	Enables cracking the screen to let hot air out
Position	Go to this position to let hot air out
Start at	Crack the screen when the temperature gets above this value
Range	Adjust the screen position proportionally to the temperature by this range

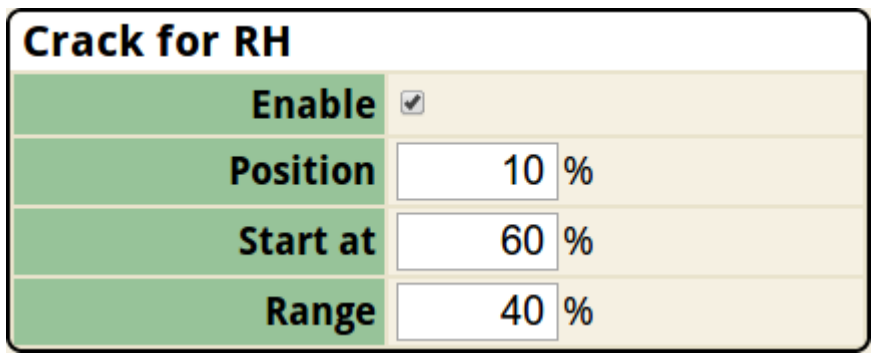
In the above settings, when the temperature gets above "*25°C*" the screen will start cracking to let the hot air out. The range controls how far the screen should open, proportional to the temperature. So at 30°C the screen would be fully cracked to "*10%*". At 27.5°C the screen would be 5% cracked. The following graph shows how this works:



Crack for RH

This section will only appear when the **Crack for RH** checkbox is ticked in the configuration section for the screen

If the screens are trapping humidity too effectively it may be desirable to let the humid air out by cracking the screen open.



Field	Description
Enable	Enables cracking the screen to let humid air out
Position	Go to this position to let humid air out
Start at	Crack the screen when the RH gets above this value
Range	Adjust the screen position proportionally to the RH by this range

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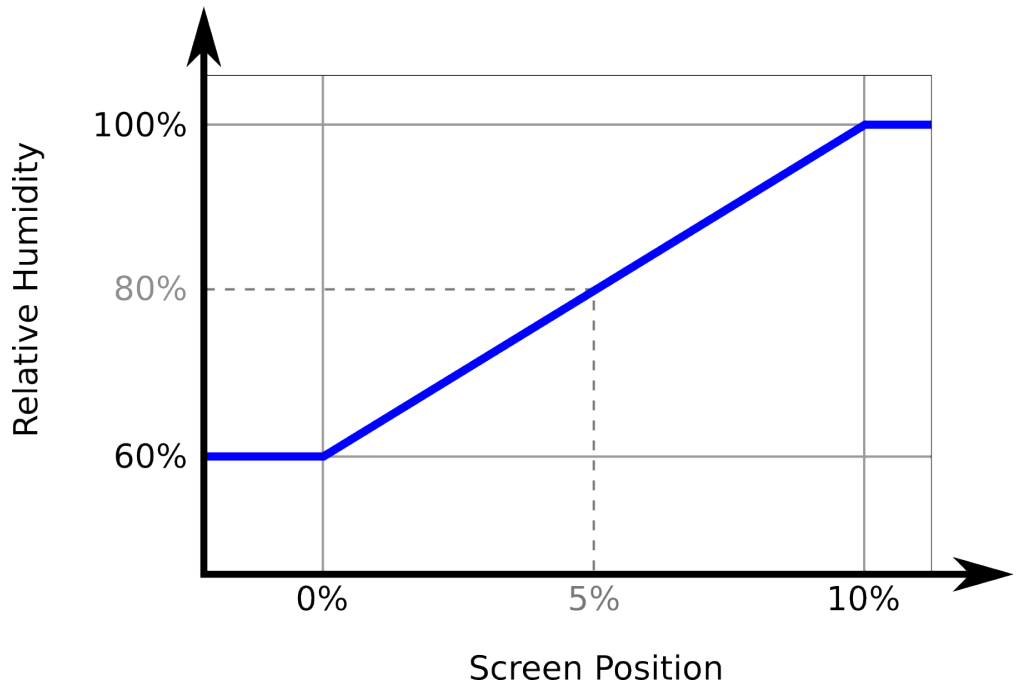
With the above settings the screen will start opening once the RH gets above "*60%*". The closer the humidity gets to 100% the further the screen will open. The following graph shows the relationship between the screen position and the relative humidity:

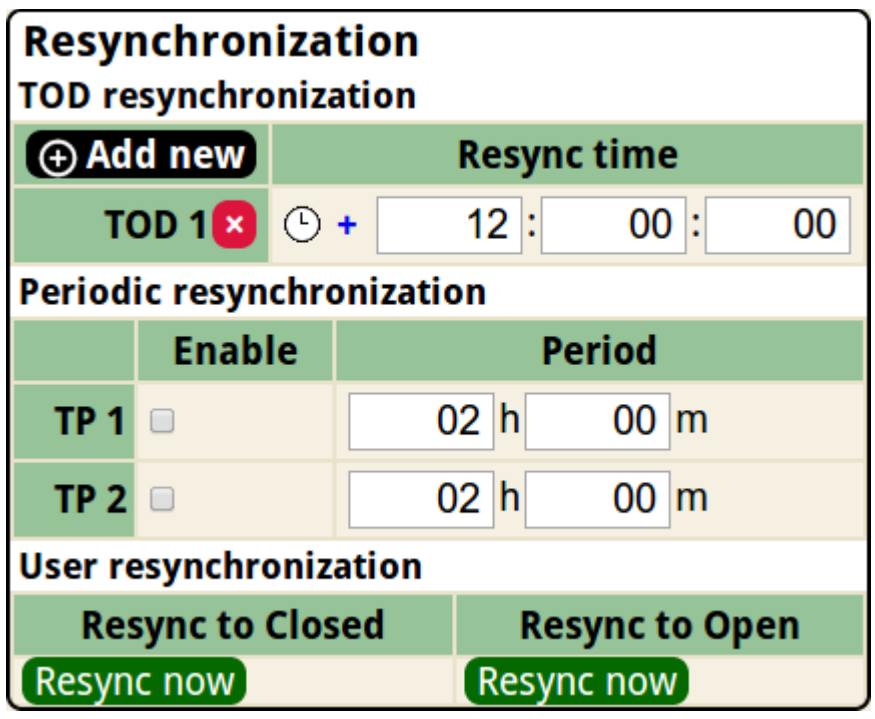


Resynchronization

The only way that the Multigrow is able to detect the position of the screens is by keeping track of how long the output has been on (and thus running the motor). It then compares this with the run time of the screen specified in the configuration to determine the percentage. The problem with this approach is that unforeseen physical effects can cause a different in the run time configured on the Multigrow, and the actual run time in real life.

Resynchronization solves the problem of screen positions getting out of sync by running the screens all the way to open or closed which is a position that it knows is 0% or 100%.

Usually a Time of Day resync is set to run at midnight so the screen position is reset to be accurate every day. However, with some older screens the position can get out of sync very easily in which case a periodic resync is used to ensure the screen position remains accurate throughout the day.



Field	Description
Add new button	Adds a new Time Of Day resync time
Delete button	Deletes a Time Of Day resync time
Resync Time	The time at which to resync the screens
Enable checkbox	Enables period resynchronization during this time period
Period	How often to do the resync
Resync Now button	Pushing this button does an immediate resync to closed
Resync Now button	Pushing this button does an immediate resync to open

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Readings

With Independent Shade Manager

By navigating to **Readings > Climate > Tomatoes > Screens** you can see the readings for the screens. This image shows the readings page when the screens are configured with an Independent Shade Manager:

Screens

	East	West
Location	Inside	Inside
Type	Shade	Shade
TP Mode	Auto	Auto
Covered	0%	59%
Reason	Shading	Shading
Output State	Idle	Manual
Switch Pos.	Auto	Manual
Fuse	OK	OK
Current Pos.	100%	41%
Desired Pos.	100%	100%

Shade Manager

Outside Solar	0W/m²
Comp. Solar	5W/m²
Calc. Shade Level	0%

Field	Description
Location	The location of the screen
Type	The type of screen
TP Mode	The mode for the current time period
Covered	How much percent the screen is covering
Reason	Allows you to see why the screen is in the current position, one of: • **Shading:** the screen is being used for shading • **Wind:** the screen is in wind protection mode • **Rain:** the screen is in rain protection mode • **Thermal:** the screen is trapping hot air
Output State	The state of the output on the output module: • **Idle:** the output is doing nothing • **Manual:** the output module is currently in manual mode
Switch Pos	The current position of the switch on the output module
Fuse	The status of the fuse on the output module
Current Pos	The current position of the screen
Desired Pos	The position where the screen should be as determined by the Multigrow
Outside Solar	The current Solar RAD reading from the weather station
Comp Solar	The current Solar RAD reading from inside the compartment
Calc Shade Level	The shade level calculated by the shade manager

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With Combined Shade Manager

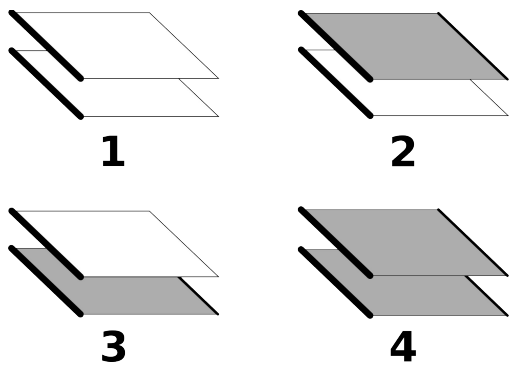
When the screens are configured with a Combined Shade Manager some extra fields will be shown in the **Shade Manager** table.

Shade Manager	
Outside Solar	6W/m²
Comp. Solar	7W/m²
Target	400W/m²
Calc. Light Level	0W/m²
Calc. Shade Level	0%
Best Combo.	1
Desired Combo.	1

Field	Description
Outside Solar	The current Solar RAD reading from the weather station
Comp Solar	The current Solar RAD reading from inside the compartment
Target	The mid point between the **Solar Level below** and **Solar Level above** fields in the Shade Manager settings
Calc Shade Level	The shade level calculated by the shade manager
Calc Light Level	The light level calculated as provided by the current combination
Calc Shade Level	The shade level provided by the current combination
Best Combo	The best combo for the current conditions
Desired Combo	For all intents and purposes this is the current combination that is enabled, and if not then it is the one the system is trying to change to

There will also be a **Combinations** table shown

Combinations				
	Valid	**Closed Screens**	**Shade Level**	**Calc. Light**
Combo 1	Yes		0%	6W/m²
Combo 2	Yes	Top Layer	40%	4W/m²
Combo 3	Yes	Bottom Layer	40%	4W/m²
Combo 4	Yes	Top Layer, Bottom Layer	64%	2W/m²



Field	Description
Valid	Simply shows if the combination is valid, if not then it won't be used
Closed Screens	Shows which screens will be closed when the combination is active
Shade Level	This is the shade level calculated from which screens are closed
Calc[ulated] Light	This is the Solar RAD reading that will get through in each combination, as calculated from the current Solar RAD reading and the combinations **Shade Level**

How does it know which Combination is the best for the conditions?

When using the Combined Shade Manager, it will calculate the **Shade Level** for each combination of screens to determine which combination is the best for the current conditions as set in the Shade Manager settings. The **Solar Level below** value is deducted from the **Solar Level above** value to determine the **Target** (as shown in the **Shade Manager** table on the readings page). Then whichever combination's **Calc. Light** value is closest to the target becomes the best combination.

We can trace this calculation visually using the **Combinations** table for different light levels. As the light level decreases, different combinations will be set as the **Best Combo** depending on which combination best meets the target (as denoted by the green line).

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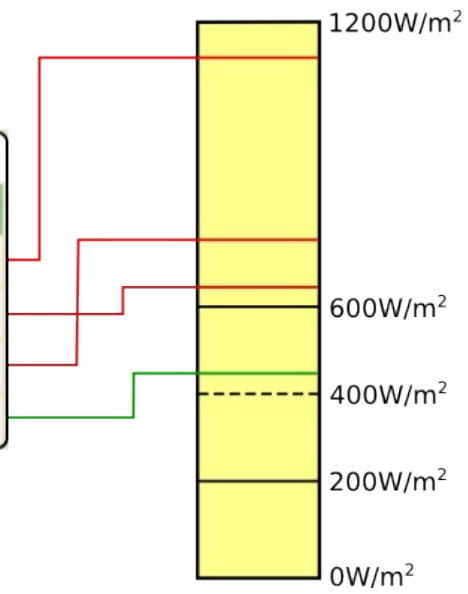
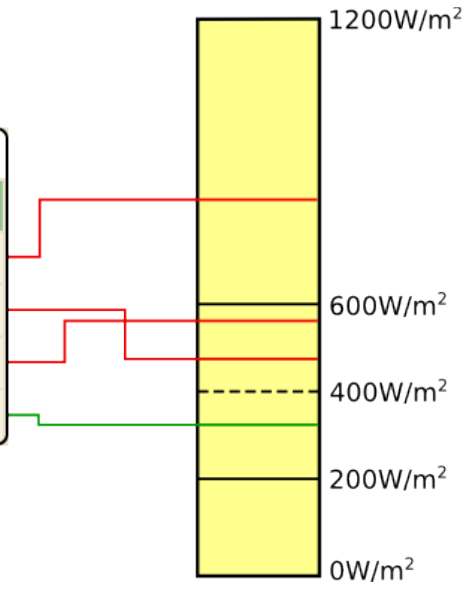
Solar RAD: 1100W/m²

Combinations				
	Valid	Closed Screens	Shade Level	Calc. Light
Combo 1	Yes		0%	1100W/m²
Combo 2	Yes	Top Layer	40%	660W/m²
Combo 3	Yes	Bottom Layer	30%	770W/m²
Combo 4	Yes	Top Layer, Bottom Layer	58%	462W/m²



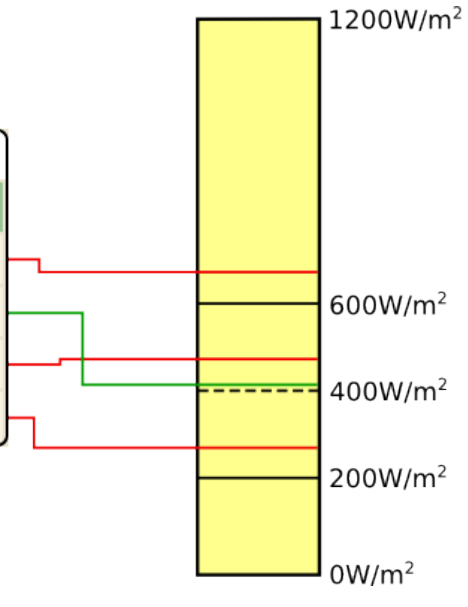
Solar RAD: 800W/m²

Combinations				
	Valid	Closed Screens	Shade Level	Calc. Light
Combo 1	Yes		0%	800W/m²
Combo 2	Yes	Top Layer	40%	480W/m²
Combo 3	Yes	Bottom Layer	30%	560W/m²
Combo 4	Yes	Top Layer, Bottom Layer	58%	336W/m²



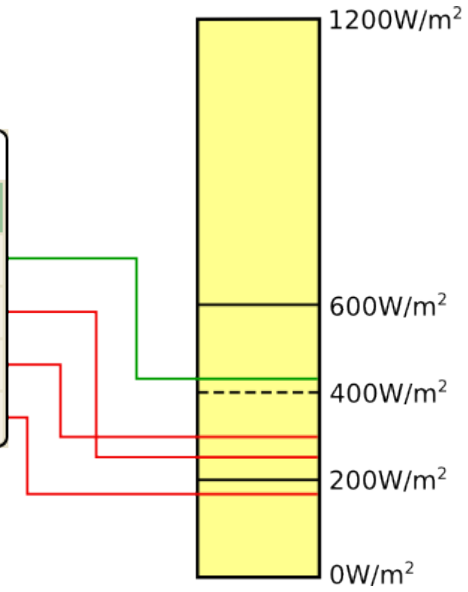
Solar RAD: 680W/m²

Combinations				
	Valid	Closed Screens	Shade Level	Calc. Light
Combo 1	Yes		0%	680W/m²
Combo 2	Yes	Top Layer	40%	408W/m²
Combo 3	Yes	Bottom Layer	30%	476W/m²
Combo 4	Yes	Top Layer, Bottom Layer	58%	285W/m²



Solar RAD: 430W/m²

Combinations				
	Valid	Closed Screens	Shade Level	Calc. Light
Combo 1	Yes		0%	430W/m²
Combo 2	Yes	Top Layer	40%	258W/m²
Combo 3	Yes	Bottom Layer	30%	301W/m²
Combo 4	Yes	Top Layer, Bottom Layer	58%	180W/m²



Note that, in all of these scenarios, unless the **Enable Auto Change** checkbox is ticked, on the settings page, the combination would not actually change until the Solar RAD reading reaches 430W/m^2. This is because the **Calc. Light** reading for **Combination 4** would not go outside the limits until that time, at which point the system would detect that and change the Combination.

When the **Enable Auto Change** checkbox is ticked, for every **Change After** period the **Best Combo** would be enabled.

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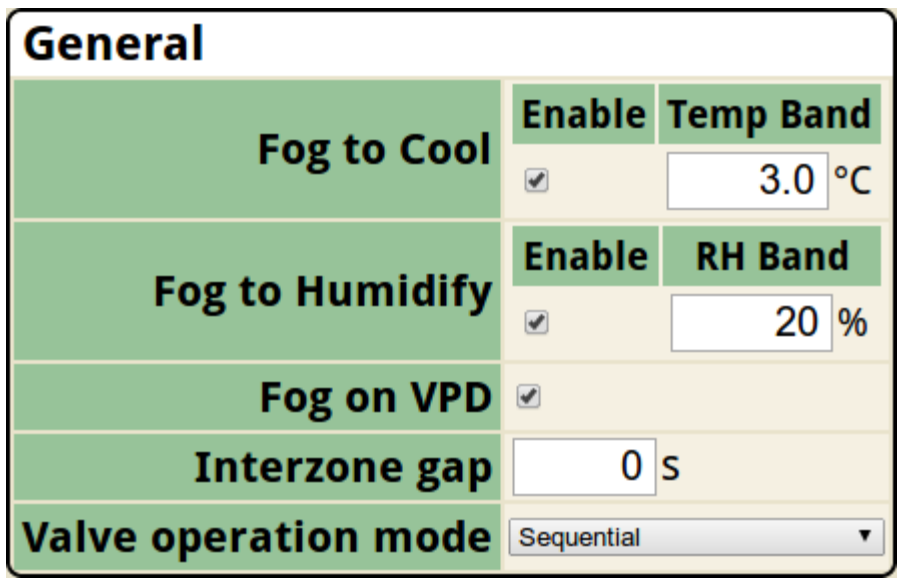
Fogging

Fogging can be used to cool your environment, humidify it or both.

To enable it navigate to **Configuration > Climate** and ensure that the checkbox labelled **Fogging Installed** is ticked for the environments that you want to enable fogging for. After pushing the **Save** button that appears navigate to **Configuration > Climate > Tomatoes > Fogging** to start configuring the options.

Configuration

Under the **General** heading we have the following options:



Field	Description
Fog to Cool Enable	Allows fogging to be used to cool the environment
Fog to Cool Temp Band	Sets the band for proportional valve timing
Fog to Humidify Enable	Allows fogging to be used to humidify the environment
Fog to Humidify RH Band	Sets the band for proportional valve timing
Fog on VPD	Start fogging if the VPD goes out of range
Interzone gap	How long to wait between fogging runs
Valve Operation Mode	• **Sequential:** makes the valves operate one after another • **Simultaneous:** makes the valves operate all at the same time

How the RH and Temperature bands work

The humidity band allows the valves to run for a time proportional to the band, this diagram assumes the following:

- **Valve Time Max. on time** is 20 seconds
- **Valve Time Min. on time** is 10 seconds
- Compartment RH target is 70%
- **Fog to Humidify RH Band** is 20%

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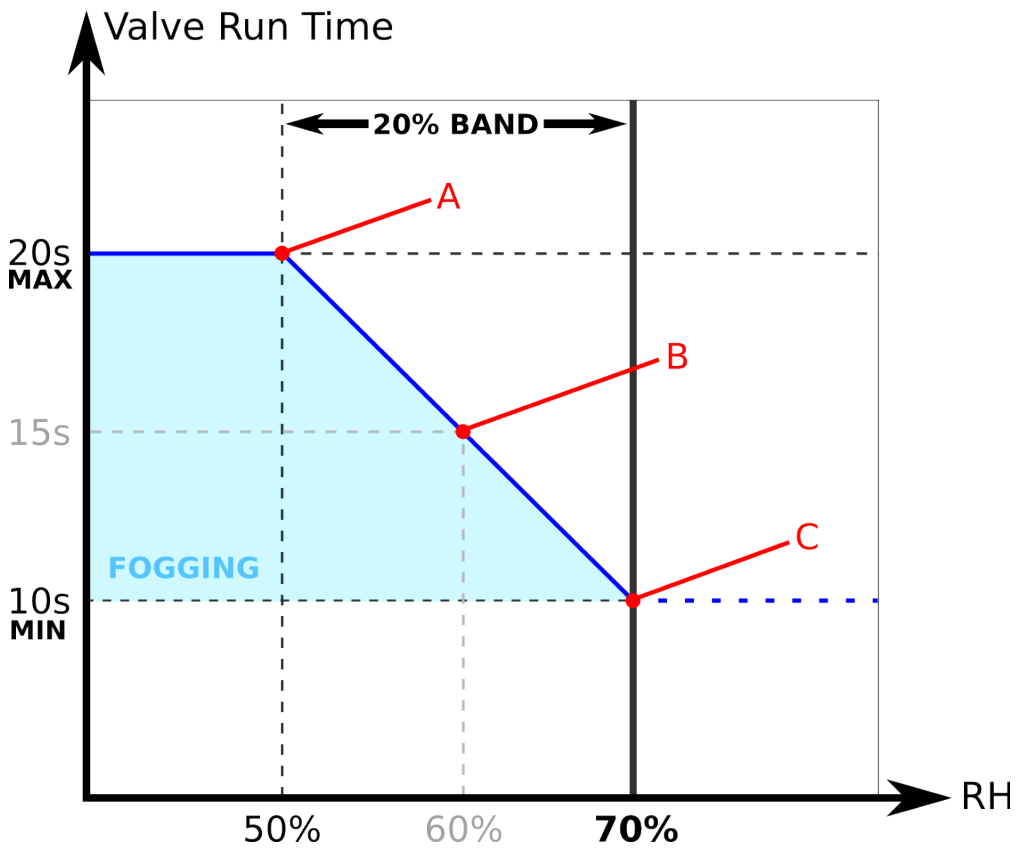
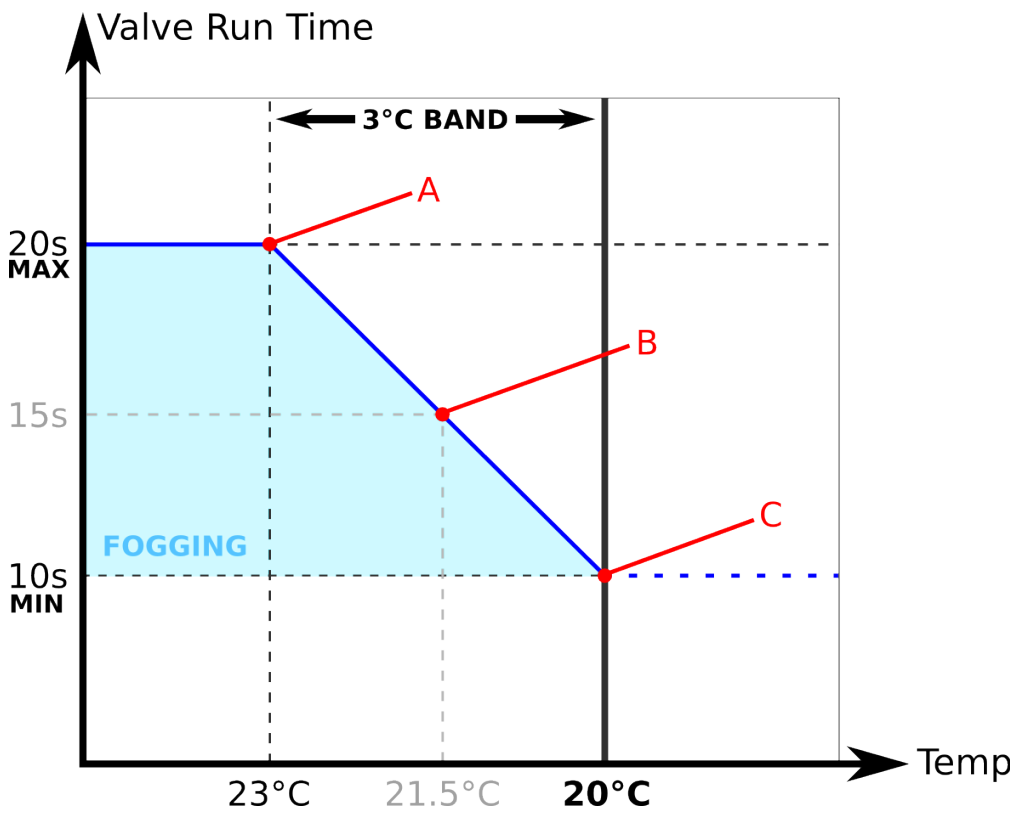


Annotation	Description
A	The fogging has been running with 20 second valve run times when the **Fog to Humidify RH Band** lower limit (50%rH) is reached. The fogging control will now start to proportionally decrease the valve run times until the RH target (70%rH) is exceeded
B	The RH is now halfway through the **Fog to Humidify RH Band** at 60%rH. The valve run time has been decreased proportionally to halfway between the min and max valve run time settings (15 seconds). This run time will continue to proportionally decrease until the RH target (70%rH) is exceeded
C	The RH target (70%rH) has been reached so the valve run time is now at it's minimum (10 seconds). Once the RH goes above 70%rH the fogging will stop

The cooling band allows the valves to run for a time proportional to the band, this diagram assumes the following:

- **Valve Time Max. on time** is 20 seconds
- **Valve Time Min. on time** is 10 seconds
- Compartment temperature target is 20°C
- **Fog to Cool Temp Band** is 3°C



Annotation	Description
A	The fogging has been running with 20 second valve run times when the **Fog to Cool RH Band** upper limit (23°C) is reached. The fogging control will now start to proportionally decrease the valve run times until the temperature is less than the target (20°C)
B	The temperature is now halfway through the **Fog to Cool Temp Band** at 21.5°C. The valve run time has been decreased proportionally to halfway between the min and max valve run time settings (15 seconds). This run time will continue to proportionally decrease until the temperature is less than the target (20°C)

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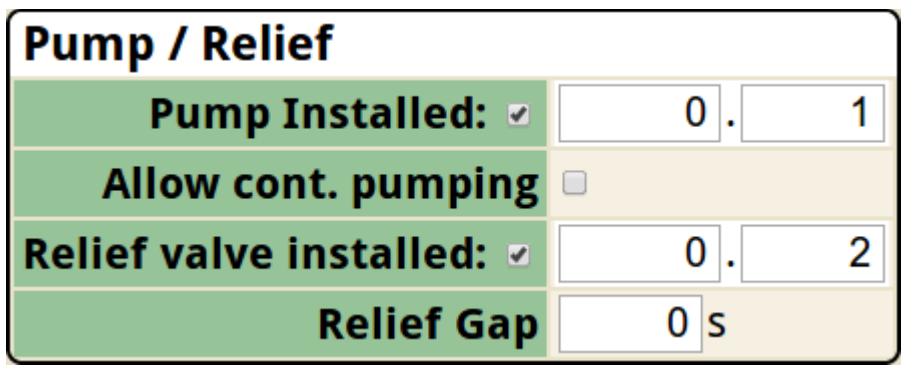
Annotation	Description
C	The temperature target (20°C) has been reached so the valve run time is now at it's minimum (10 seconds). Once the RH goes below 20°C the fogging will stop

Pump and Relief valves

> The relief options are for use in systems where the plumbing cannot handle the fogging water pressure for extended periods of time.

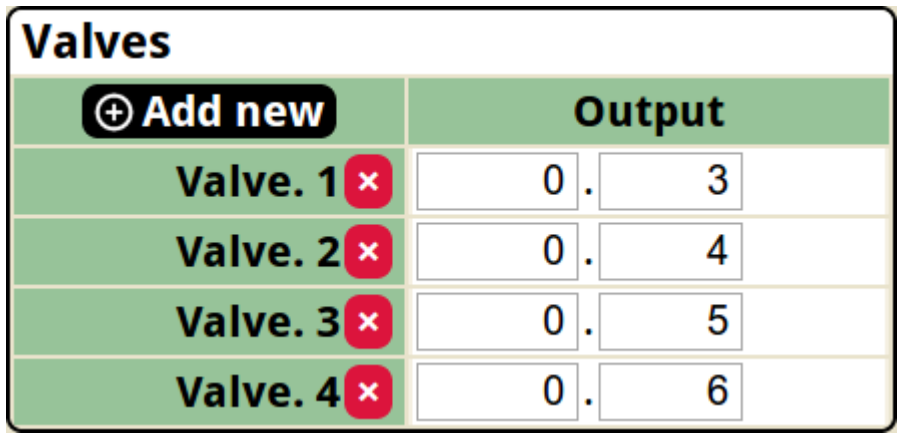
Under the Pump/Relief heading these options are available:



Field	Description
Pump Installed	Signals that a pump is installed and enables the Output Address entry for that pump
Allow cont. pumping	Allows the pump to run continuously, so the rest time setting disappears
Relief valve installed	If a relief valve is installed this allows the output address to be specified
Relief Gap	Amount of time before relief valve gets open

Fogging Valves

You can also add as many valves are used and specify the output address for each:



Settings

By navigating to **Settings > Climate > Tomatoes > Fogging** you will be able to adjust the control options for fogging.

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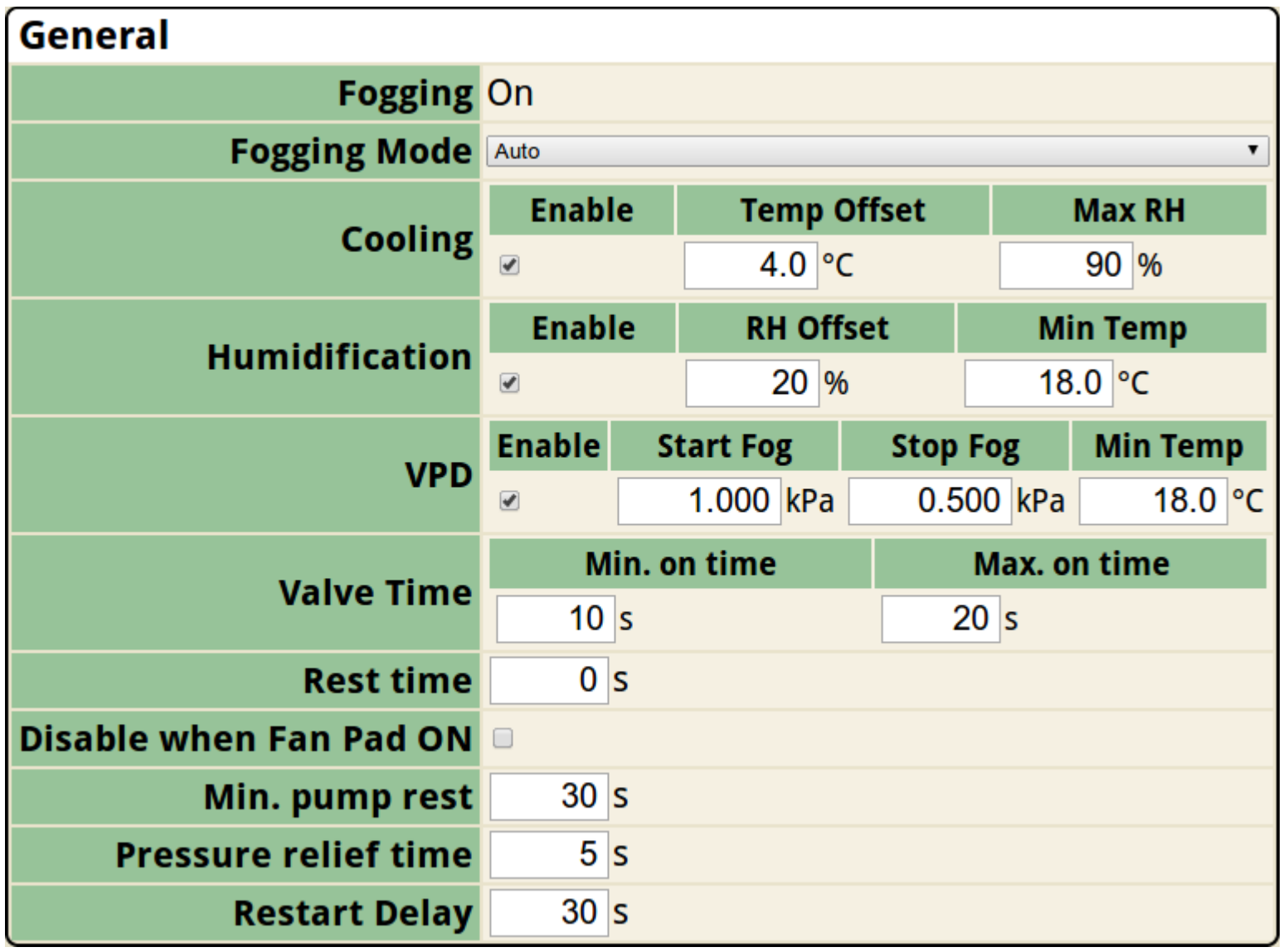

Name	Description
Fogging	Indicates if the fogging is currently running
Fogging Mode	• **On:** force the fogging to on • **Off:** force the fogging to off • **Auto:** let the Multigrow decide whether to fog or not
Cooling Enable	Enable using the fogging for cooling purposes
Cooling Temp Offset	Start fogging once the temperature gets above Compartment Cooling Target + Offset
Cooling Max RH	Stop fogging if the RH gets above this value
Humidification Enable	Enable using the fogging for raising the relative humidity
Humidification RH Offset	Start fogging if the humidity gets to Compartment RH Target + Offset
Humidification Min Temp	Stop fogging if the temperature gets below this value
VPD Enable	Enable fogging to control VPD
VPD Start Fog	Start fogging once the VPD reaches this value
VPD Stop Fog	Stop fogging once the VPD reaches this value
VPD Min Temp	Stop fogging if the temperature gets below this value
Valve Min on time	The minimum time that the valve should be on for
Valve Max on time	The maximum time that the valve should be on for
Rest Time	How long to rest after all the valves have run
Disable when Fan Pad ON	Disables fogging if the fan pad is running
Min pump rest	When controlling the fogging pump, this determines how long to let the pump rest (only present with relief valves installed and continuous pumping disabled)
Pressure relief time	If there is a pressure relief valve, this releases the pressure after a fogging trigger (only present with relief valves installed and continuous pumping disabled)
Restart Delay	How long to wait between fogging triggers

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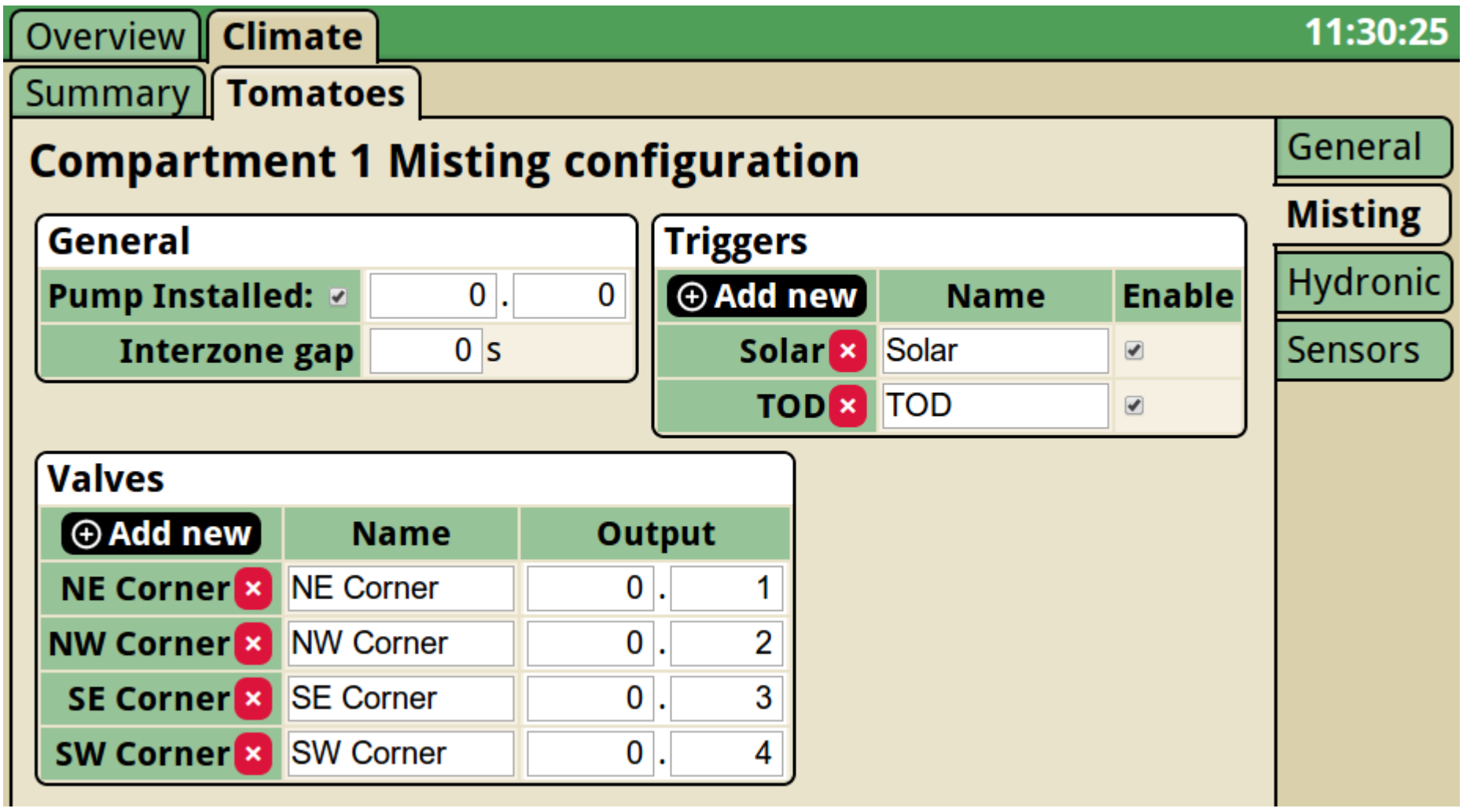
Misting

Configuration

To add misting to a compartment navigate to **Configuration > Climate > Summary** and tick the checkbox labelled **Misting Installed** for the relevant compartment. After pushing the **Save** button that appears, navigate to **Configuration > Climate > Tomatoes > Misting** and you will see the following configuration options:



Under general you can set the Output Address for the pump if one is installed and set the **Interzone Gap** to control how long to wait between firing each valve.

Triggers

In this section you can setup individual triggers that will start the misting. In the control settings these triggers can be assigned to individual valves, to allow some valves to be triggered by solar, and others to be triggered at a certain time of day, if so desired.

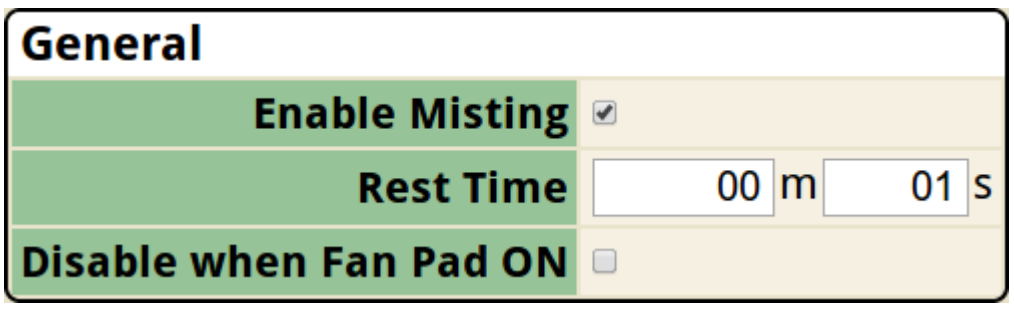
If need be you can give each trigger a *Name** and set the enabled status by ticking or unticking the **Enable** checkbox.

Valves

You can add valves for each misting valve in your system by pushing the **Add new** button, give it a **Name** (optional) and specify the **Output** Address.

Settings

By navigating to **Settings > Climate > Tomatoes > Misting** you can adjust the control options.



You can disable misting entirely by unticking the **Enable Misting** checkbox. Setting the **Rest Time** controls how long to wait between turning the misting pump off and back on. You can also stop misting if the fan pad is on by ticking the **Disable when Fan Pad ON** checkbox.

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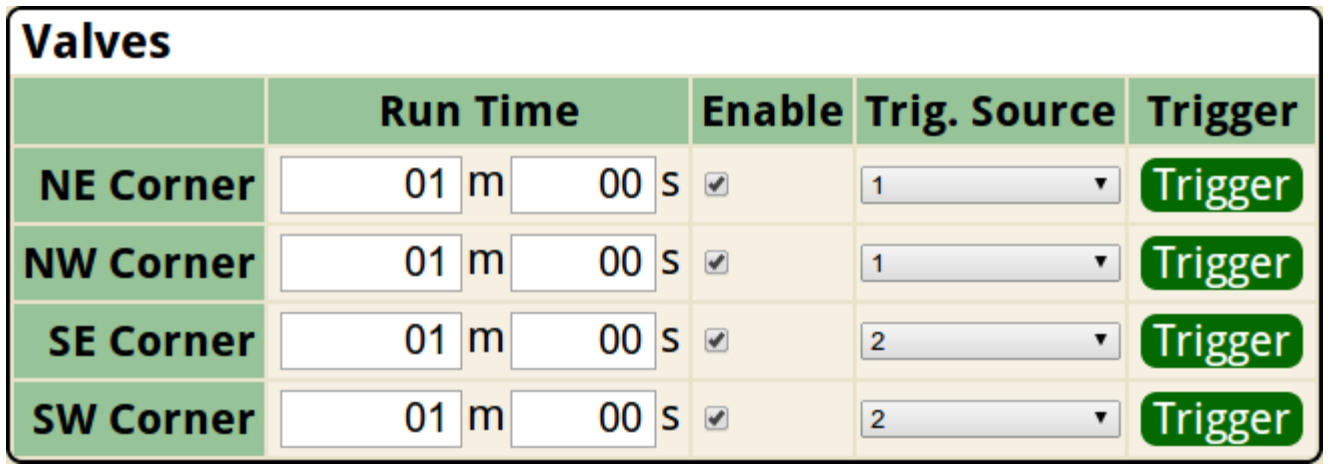
Valves

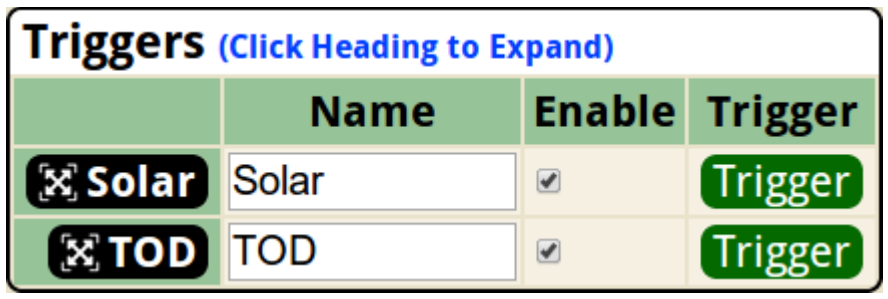
Each valve has a number of individual settings.



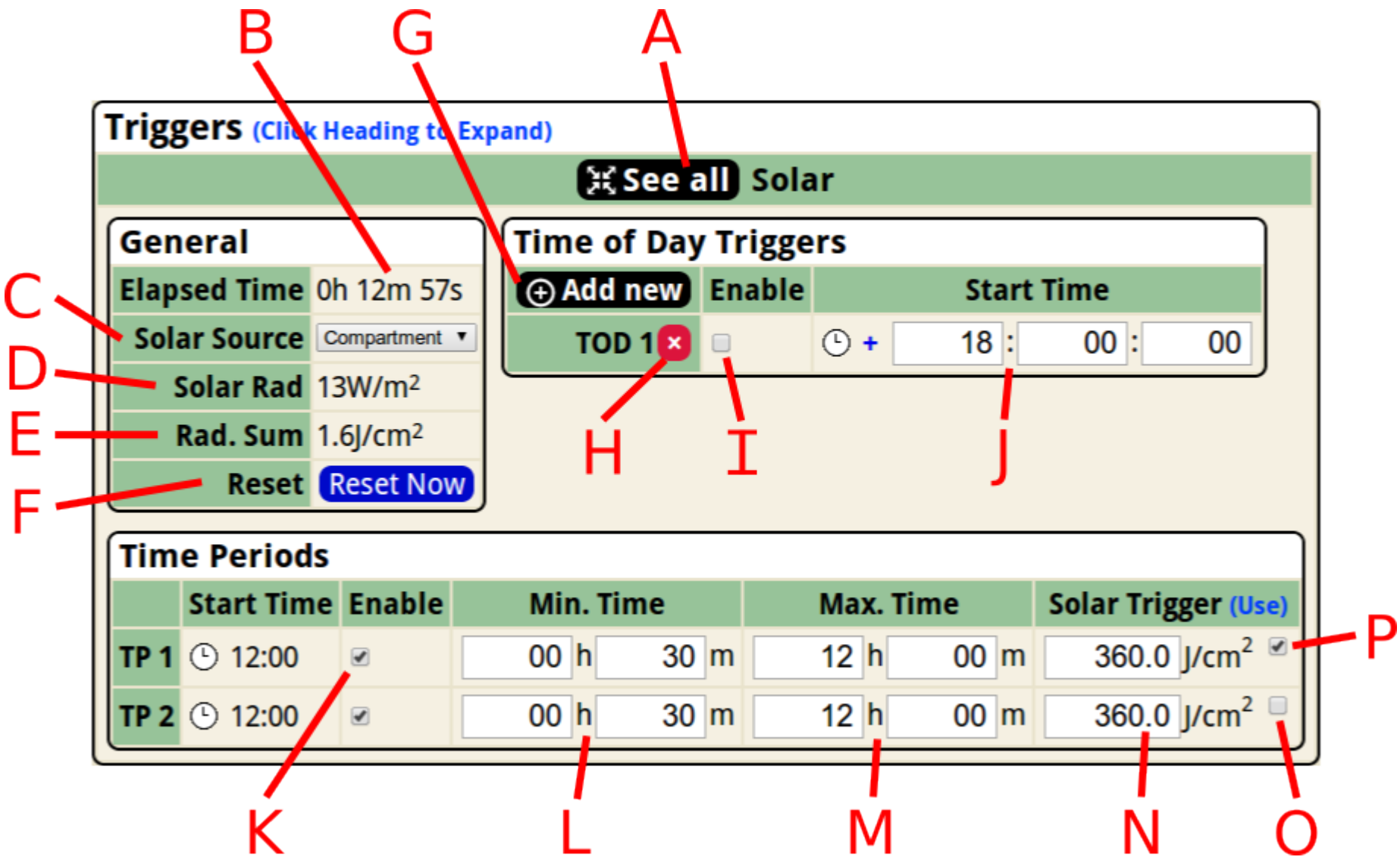
The **Run Time** controls how long the valve should mist for and you can disable individual valves by unticking the **Enable** checkbox. The **Trig[ger] Source** dropdown box allows you to select which trigger should cause the valve to mist. The number of the trigger source corresponds to the trigger number. In this case **Solar** would be "*1*" and **TOD** would be "*2*". The **Trigger** button triggers that valve to mist immediately for the **Run Time** specified.

Triggers

The triggers section allows you to disable or enable each trigger using the **Enable** checkbox, and so any valves that use that trigger. You can also make any valves that use a trigger start misting by pushing the **Trigger** button for that trigger.



Pressing the expander button for a trigger (e.g. **Solar**) will allow you to setup what causes a trigger to occur.



Annotation	Name	Description
A	**See all button**	This button collapses the current trigger and allows you to see all the triggers

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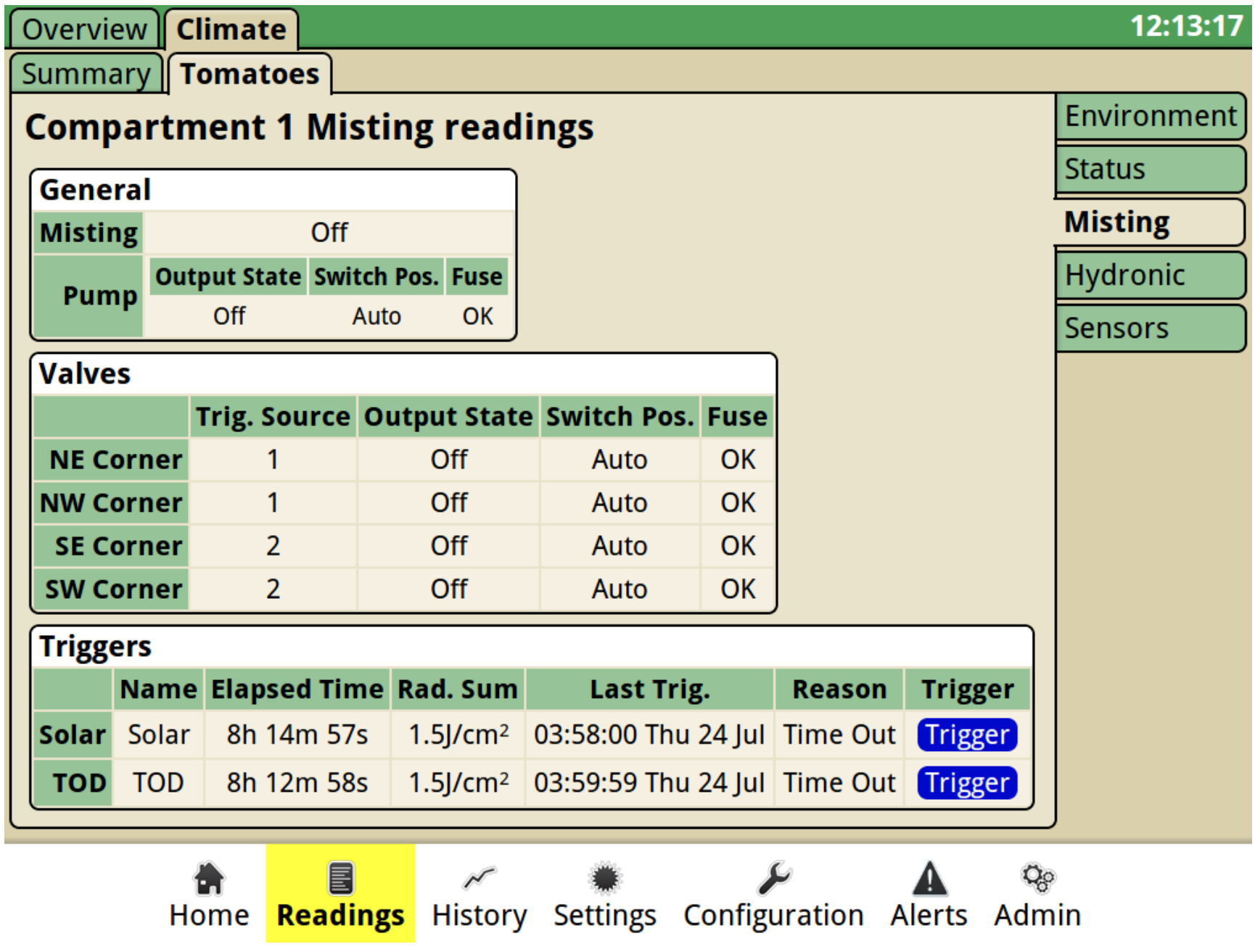
Annotation	Name	Description
B	**Elapsed Time**	Time since the last trigger occurred
C	**Solar Source**	Allows you to select the source for the solar readings. This can be set to one of: • **Compartment:** get the solar readings from the compartment • **Weather:** get the solar readings from the weather station
D	**Solar Rad**	The current Solar RAD readings
E	**Rad Sum**	The amount of solar accumulated since the last trigger occurred
F	**Reset Now button**	Resets the **Elapsed Time** and the **Rad Sum**
G	**Add new button**	Adds a new **Time of Day Trigger**
H	**Delete button**	Deletes a **Time of Day Trigger**
I	**Enable checkbox**	Enables a time of day trigger
J	**Start time**	The time that the trigger should trigger
K	**Enable checkbox**	Enables periodic triggers inside the time period
L	**Min Time**	The mimimum time to wait since the last trigger, to trigger again
M	**Max Time**	The maximum time to wait since the last trigger, to trigger again
N	**Solar Trigger**	The amount of solar required to trigger this trigger
O	**Use checkbox**	When ticked this becomes a solar trigger and when unticked it becomes a periodic trigger

Readings

The readings page is quite simple. It shows a summary of what the current activity of the misting is.



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General

Field	Description
Misting	Shows if the misting is either *Off* or *On*
Pump Output State	The current state of the pump output, either *Off* of *On* (the pump should be running when the latter is shown)
Switch Pos.	The current pump switch position on the Output Module, *Auto* or *Manual*
Pump Fuse	The status of the fuse on the Output Module

Valves

The valves section shows all the valves in rows and various readings in columns:

Column	Description
Trig[ger] Source	The trigger source for this valve (the number refers to the order the triggers show up in the trigger table)
Output State	The current state of the valves output, either *On* or *Off* (in the former case the valve should be misting)
Switch Pos.	The current switch position on the Output Module, either *Auto* or *Manual*
Fuse	The status of the fuse on the Output Module

Triggers

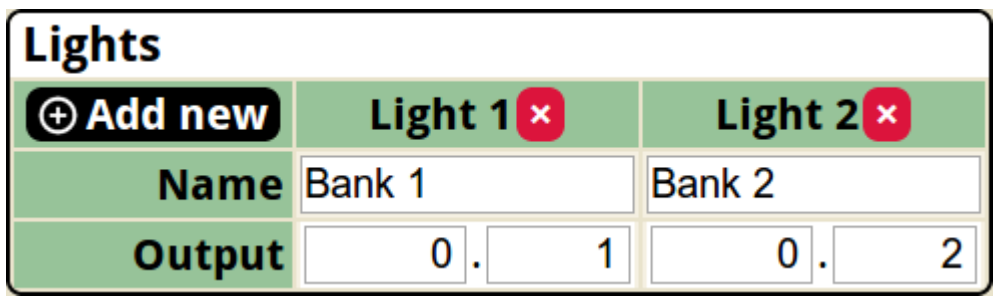
This section shows a summary for each trigger that is setup for the misting.

Column	Description
Name	The name of the trigger
Elapsed Time	The time since the trigger was last triggered
Rad[iation] Sum	The amount of radiation accumulated since the last
Last Trig[gered]	The last time the trigger was triggered
Reason	The reason for the trigger
Trigger button	Manually trigger the trigger

Lighting

Configuration

To configure lights for a compartment navigate to **Configuration > Climate > Summary** and tick the checkbox labelled **Lighting Installed**. After pressing the **Save** button that appears, navigate to **Configuration > Climate > Tomatoes > Lighting** to add lights, name them and configure the output addresses:



That was easy. Press the **Save** button that appears and navigate to **Settings > Climate > Tomatoes > Lighting** to setup the control options. You will also need to push the **Activate** button on the configuration bar to get the readings on the settings page to show up.

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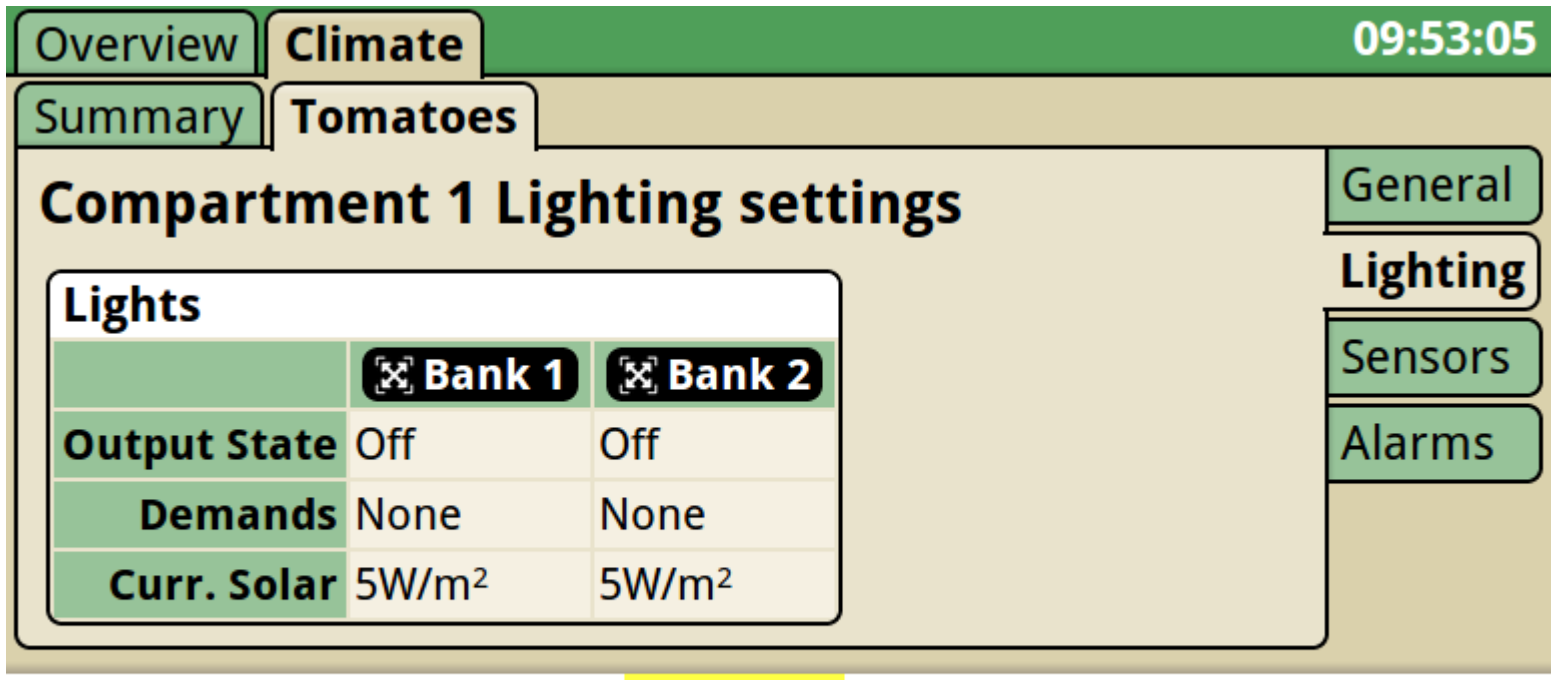
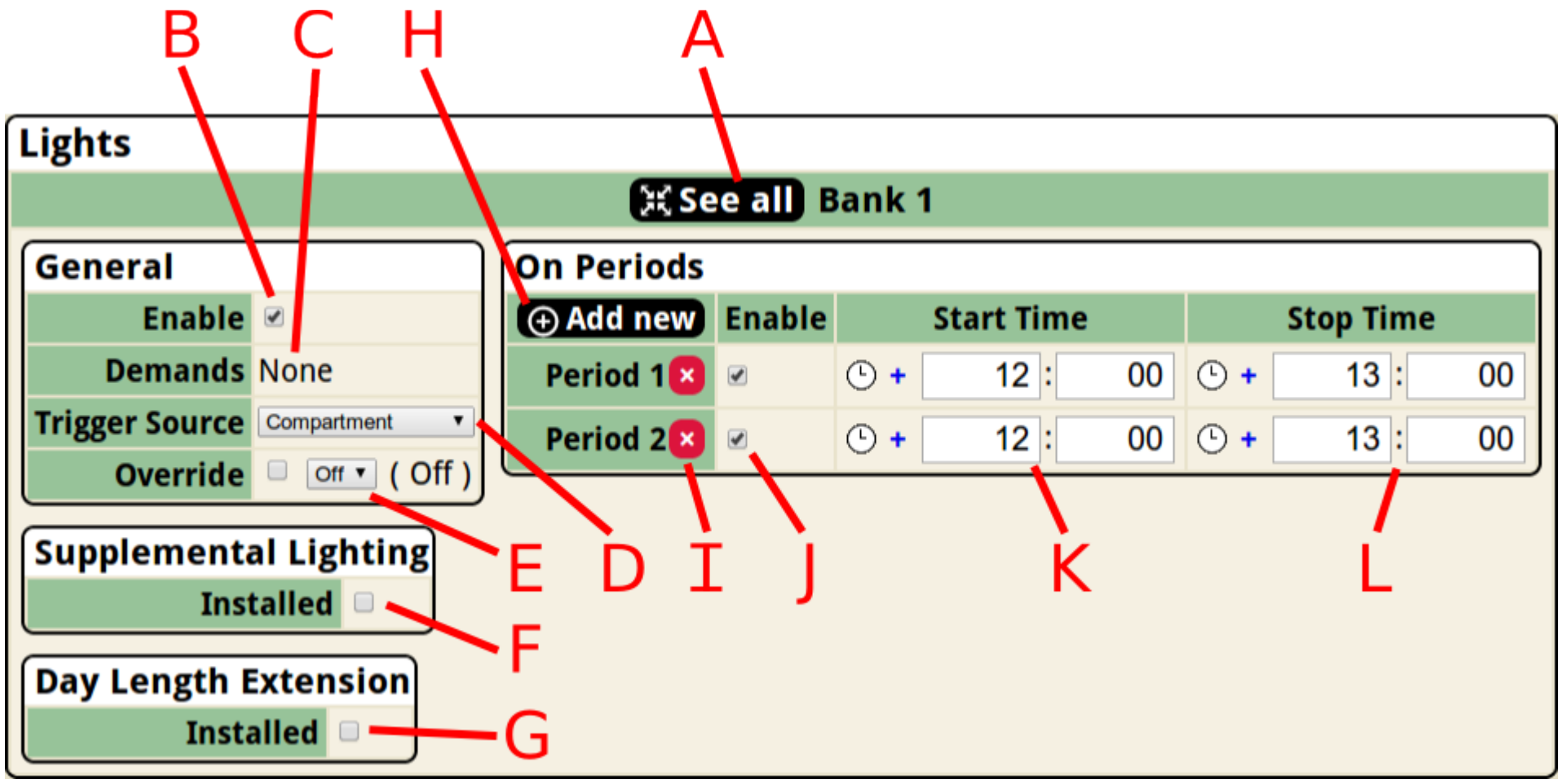
Settings



Press the expander button for the lighting system (in this case **Bank 1**) to modify the control settings:



Annotation	Name	Description
A	**See all button**	Collapses the currently shown lighting system to show all the lighting systems
B	**Enable checkbox**	Enables this lighting system
C	**Demands**	Shows what demands there are for lighting
D	**Trigger Source**	Which sensor to use for triggering the lights, "*Compartment*" or "*Weather*" station
E	**Override**	Force the lights to be either "*On*" or "*Off*" by ticking the checkbox and setting the dropdown box
F	**Supplemental Lighting**	When this checkbox is ticked and the **Save** button pushed, daytime supplemental lighting control will be enabled
G	**Day Length Extension**	When this checkbox is ticked and the **Save** button pushed, day length extension control will be enabled
H	**Add new button**	Adds a new on period that the lights should be turned on for
I	**Delete button**	Deletes an existing on period from the table
J	**Enable checkbox**	When ticked, allows the lights to turn on during this on period
K	**Start Time**	The time, in hours since midnight, for the lights to turn on (currently midday)

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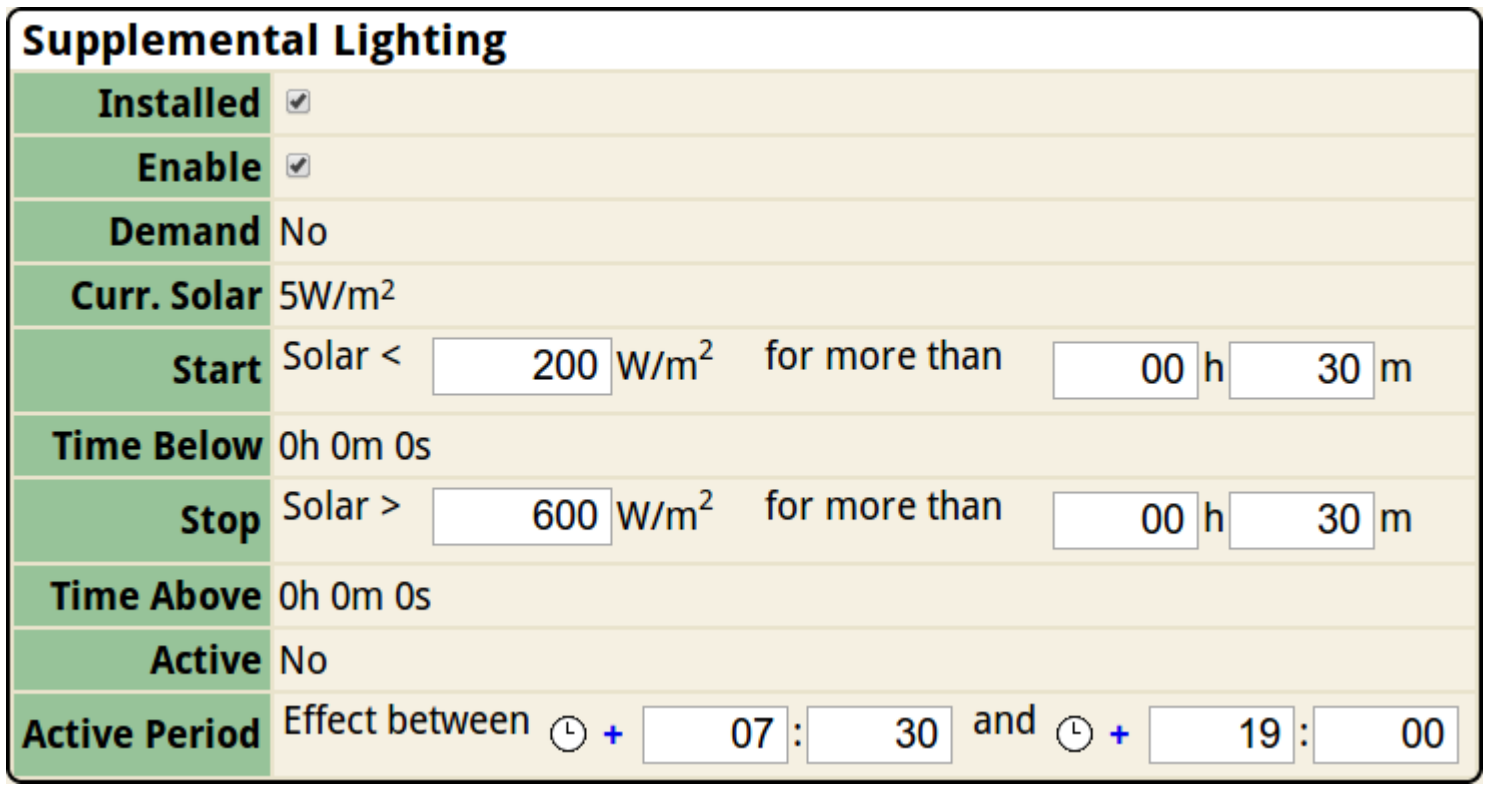
Annotation	Name	Description
L	**Stop Time**	The time, in hours since midnight, for the lights to turn off (currently 1pm)

Supplemental Lighting Control

Supplemental lighting is used to ensure that the plants will always get enough photosynthetically active radiation (PAR), even on dull or cloudy days. The Multigrow will watch the Solar RAD readings during the day and turn the lights on and off depending on the thresholds configured in the settings

When Supplemental Lighting control is enabled, the following settings will appear when the expander button is pushed:



Field	Description
Installed	When unticked, the supplemental lighting will be uninstalled, and the settings here will be lost
Enable	When unticked, the supplemental lighting settings will not be lost, but they will not be enabled
Demand	Is there currently demand for supplemental lighting?
Curr Solar	The current solar reading
Start	The rules for turning the lights on to supplement PAR. In the above settings, if the Solar RAD reading is less than 200W/m^2 for more than 30 minutes, the lights will turn on (because there must be lots of cloud cover)
Time Below	How long the solar has been below 200W/m^2
Stop	The rules for turning off the supplemental lighting. In the above settings, if the Solar RAD reading is more than 600W/m^2 for more than 30 minutes the lights will turn off (because the sun must have come back out)
Time Above	How long the solar has been above 600W/m^2
Active	Is the supplemental lighting currently active?
Active Period	Only let the supplemental lighting be active during this period (in this case, 730am and 7pm)

Day Length Extension Control

Day Length Extension allows the Multigrow to monitor the Solar RAD readings and turn on the lights to ensure the plants get the required amount of light levels each day

When Day Length Extension control is enabled, the following settings will appear when the expander button is pushed:

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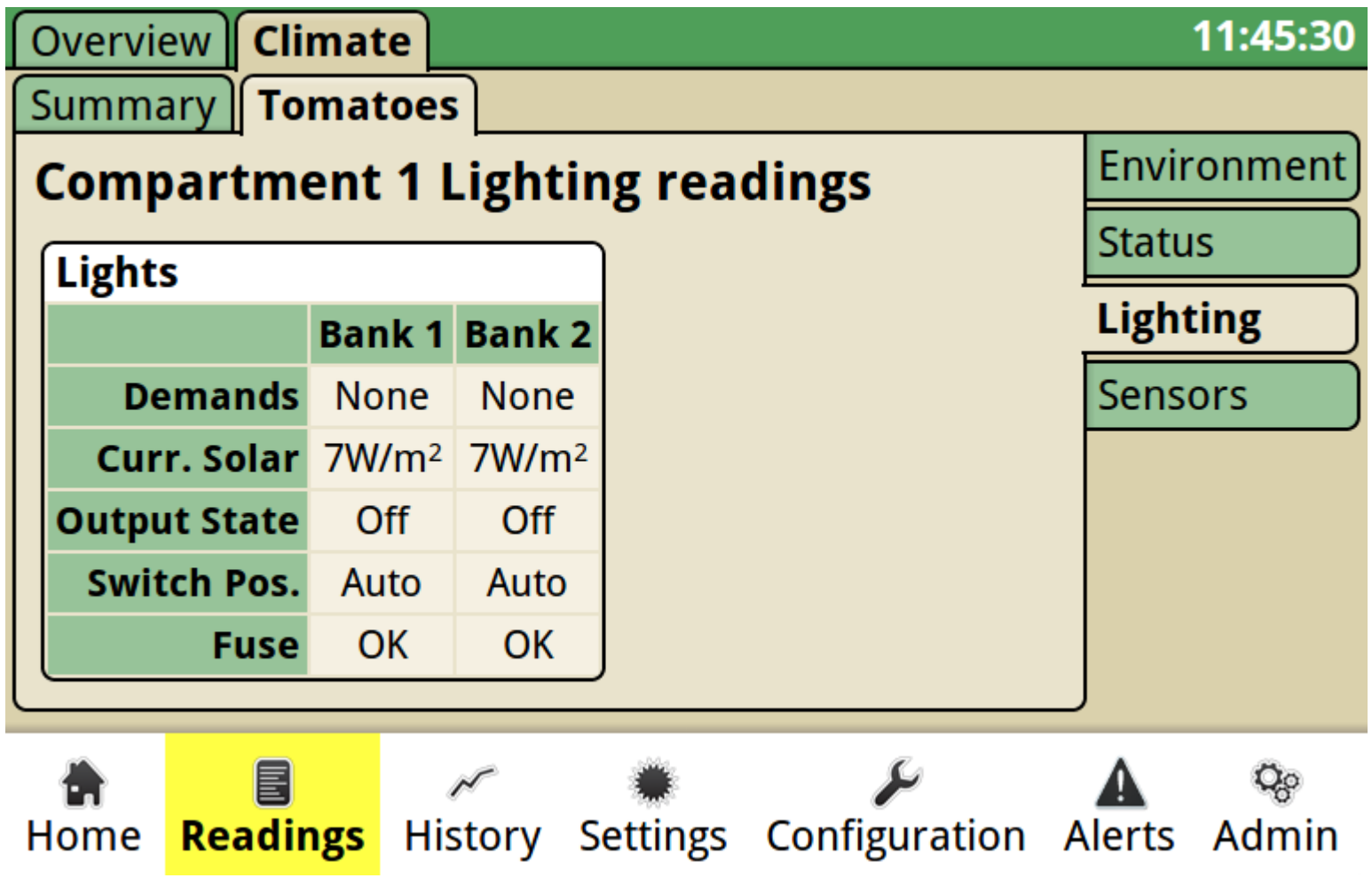
Day Length Extension	
Installed	☑
Enable	☑
Demand	No
Curr. Solar	5W/m²
Min. Light Level	400 W/m²
Time Above	0h 0m 0s
Required	10 h 00 m
Active	No
Active Period	Effect between + 17 : 00 and + 21 : 00

Field	Description
Installed	Unticking this uninstalled the Day Length Extension control and all the settings will be lost
Enable	Unchecking this will disable day length extension but not lose the settings
Demand	Is there any demand for Day Length Extension right now
Curr Solar	The current solar reading
Min Light Level	The minimum light level that the plants need for the **Required** amount of time
Time Above	The amount of time that **Min Light Level** has been achieved or exceeded throughout the day
Required	The required time that the plants need light of levels above the **Min Light Level** per day
Active	Are the lights active now?
Active Period	The lights should only turn on during this period to top up the light hours

Readings

Navigate to **Readings** > **Climate** > **Tomatoes** > **Lighting** to see the readings page. It shows some basic information about the lights that are installed.



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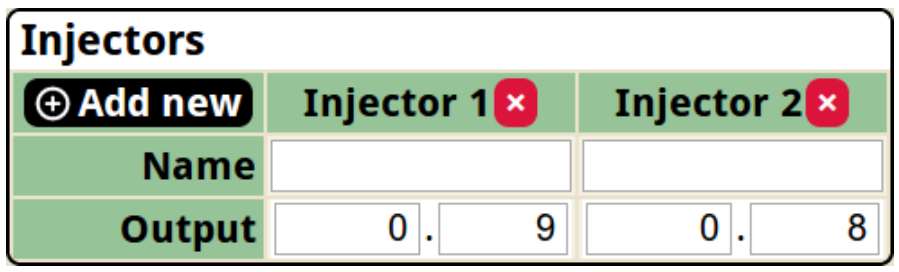
Field	Description
Demands	Are there any demands for lighting right now?
Curr. Solar	The current Solar RAD reading
Output State	The state of the output, *On* or *Off*
Switch Pos	The switch position on the Output Module, *Auto* or *Manual*
Fuse	The status of the fuse in the Output Module

CO_2

Configuration

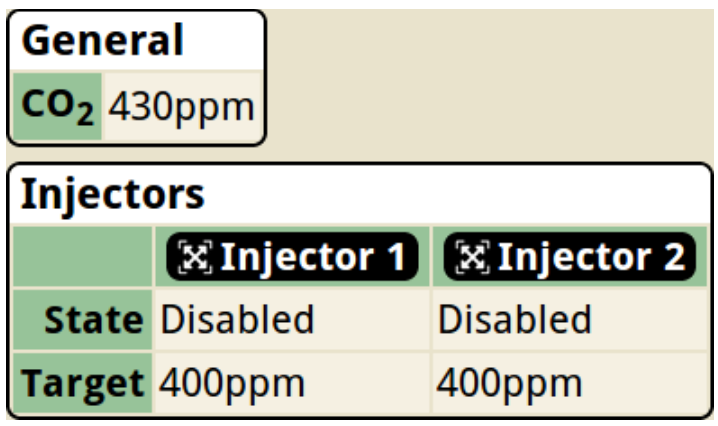
To enable CO_2 injection, navigate to **Configuration > Climate > Summary**, tick the checkbox labelled **CO_2 Installed** and push the **Save** button that appears.

You can then navigate to **Configuration > Climate > Tomatoes > CO_2** and use the **Add new** button to add CO_2 injectors. You can also give them a name if you wish and specify which outputs control each injector.

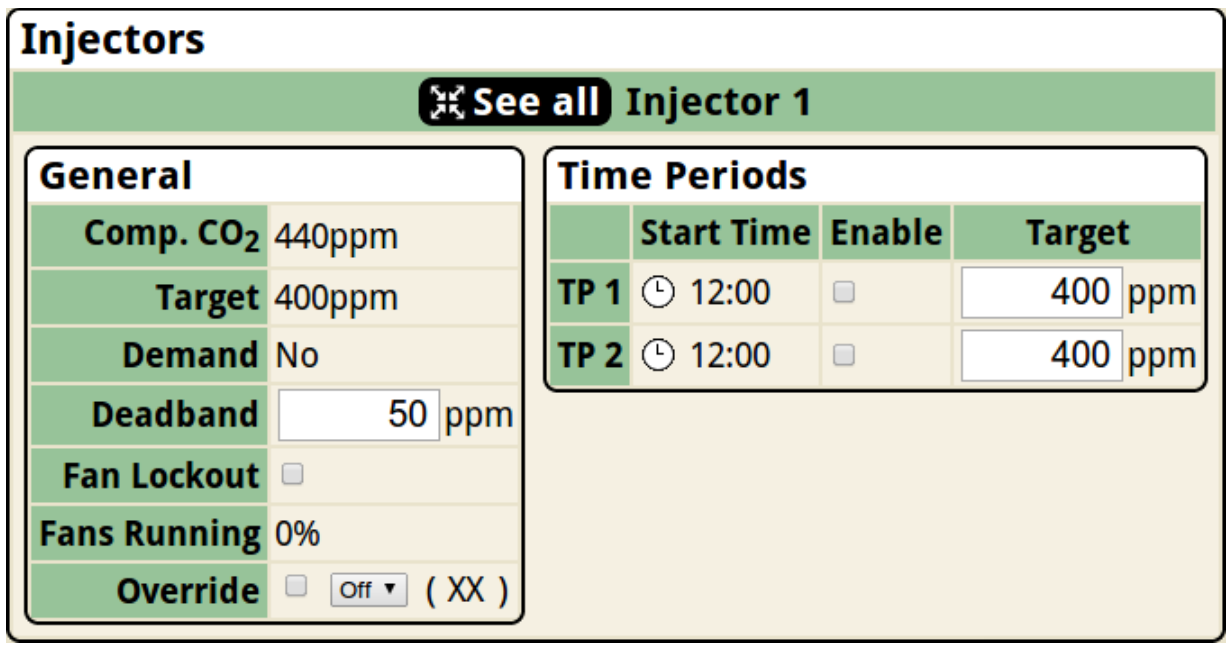


Settings

By navigating to **Settings > Climate > Tomatoes > CO_2** you can setup the control options for CO_2 injection. By default it will just show the current CO_2 reading along with the **State** and PPM **Target** of each injector.



By clicking on the expander buttons you can specify the settings for each individual injector:



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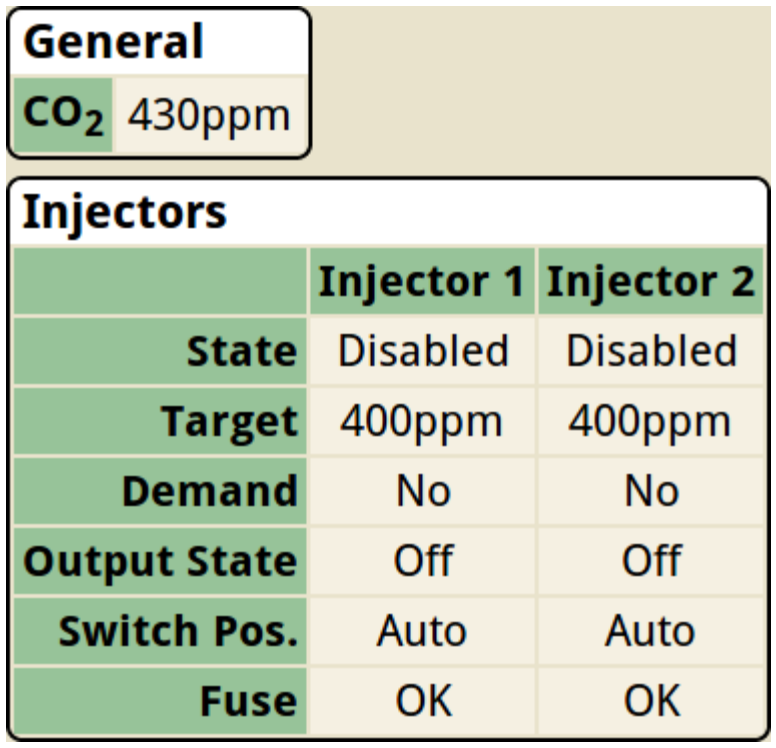
Field	Description
Comp CO_2	The current CO_2 reading of the compartment
Target	The current target for this compartment and time period
Demand	Is there a current demand for CO_2?
Deadband	The deadband. Start injecting at *Target - Deadband* (350ppm), stop injecting at *Target + Deadband* (450ppm)
Fan Lockout	Stop the fans running when injecting CO_2
Fans Running	The percentage at which the fans are currently running
Override	Allows overriding the injectors to "*On*" or "*Off*"

You will also see that in the **Time Periods** table you can specify which time periods the CO_2 injection should be enabled for by ticking the **Enable** checkbox, and the respective CO_2**Target**.

Readings

The CO_2 readings page is fairly simple:



Field	Description
CO_2	The current CO_2 reading
State	The state of this injector
Target	The target of this injector
Demand	Is there any demand for CO_2 from this injector?
Output State	The current state of the output for this injector, *On* or *Off*
Switch Pos	The switch position of this injectors output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Heatpumps

Cannot include /climate/heatpumps - does not exist yet

Hydronic

Hydronic is only available when the compartment is configured as a **Smart** Compartment

WARNING: The Multigrow does not and will not have any control over the Boiler itself. It is up to the installer or grower to set the limits correctly depending on the manufacturer specifications for the Boiler. Autogrow Systems Limited will not accept any responsibility for damage due to

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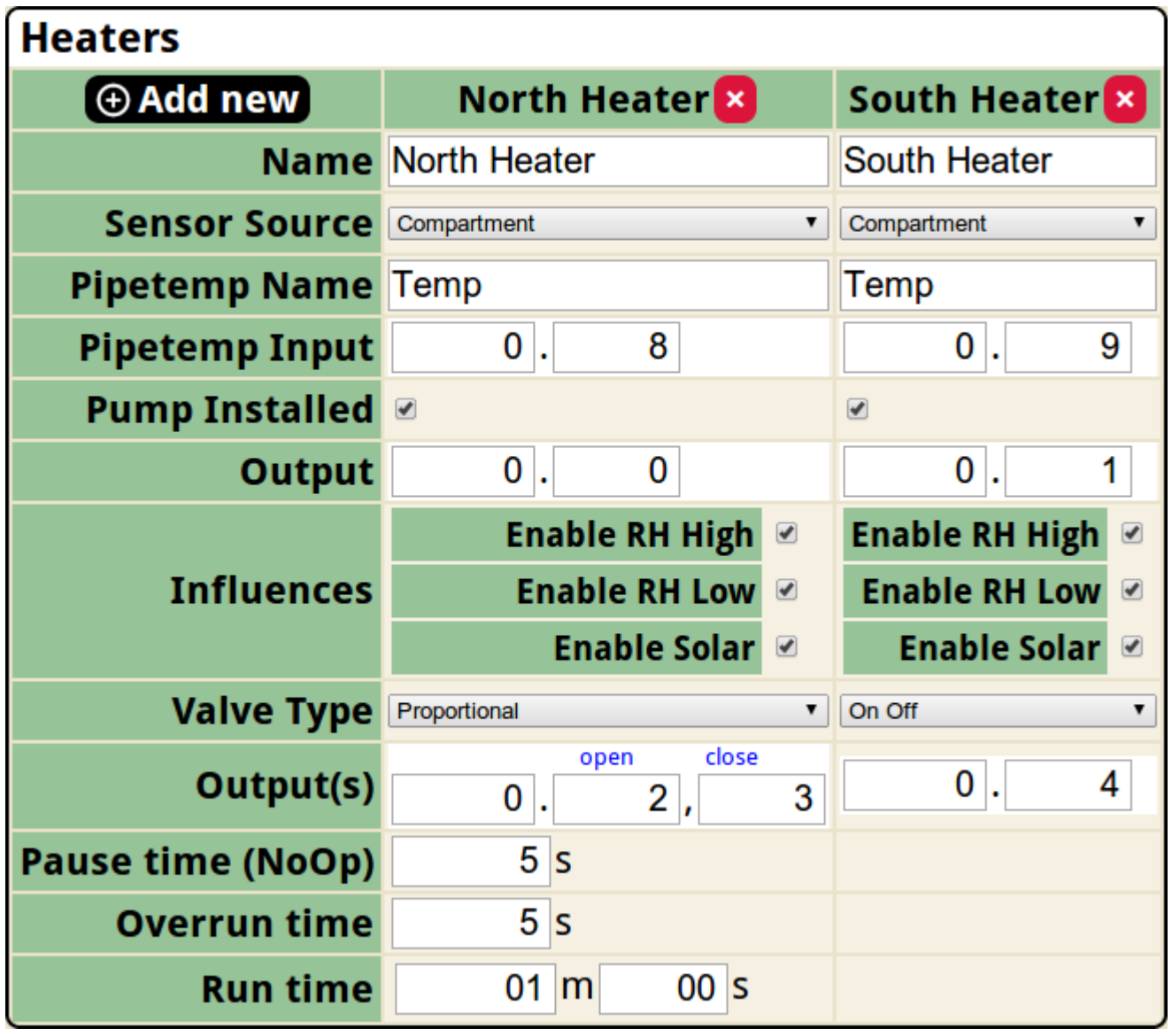
incorrect hydronic settings leading to boiler failure.

Configuration

To enable Hydronic control navigate to **Configuration > Climate > Summary** and tick the checkbox labelled **Hydronic Installed** for the relevant compartment. Push the **Save** button that appears and navigate to **Configuration > Climate > Tomatoes > Hydronic**. Push the **Add new** button and you will see the following configuration options for heaters:



Field	Description
Name	The name for the heater
Sensor Source	The source for detecting if the heater needs to be used: • **Compartment:** use the sensor from the compartment • **Independent:** use an independent sensor
Pipetemp Name	The name of the pipe temperature input
Pipetemp Input	The input address that the pipetemp sensor is hooked up to (**K** in the diagram below)
Pump Installed	Tick this if the heater pump should be controller by the Multigrow
Output	The output address for the heater pump (**G** or **I** in the diagram below)
Influences	Enables influencing the heater targets by the RH or solar readings
Valve Type	• **Proportional:** a mixer type valve that mixes recirculated water with boiler water to get the desired pipe temperature • **On Off:** a simple on off type valve
Output	The output address of the valve for this heater (**F** or **H** in the diagram below). Can also be set to the pump output to use a pump as an on/off valve in conjunction with a non-return valve (**Pump Installed** must be unticked in this instance)
Pause time (NoOp)	How long to wait after reaching an extreme (fully open or fully closed) before running the opposite way
Overrun time	How long to run after the run time to ensure the limit is reached
Run time	How long it takes for the valve to run from fully open to fully closed

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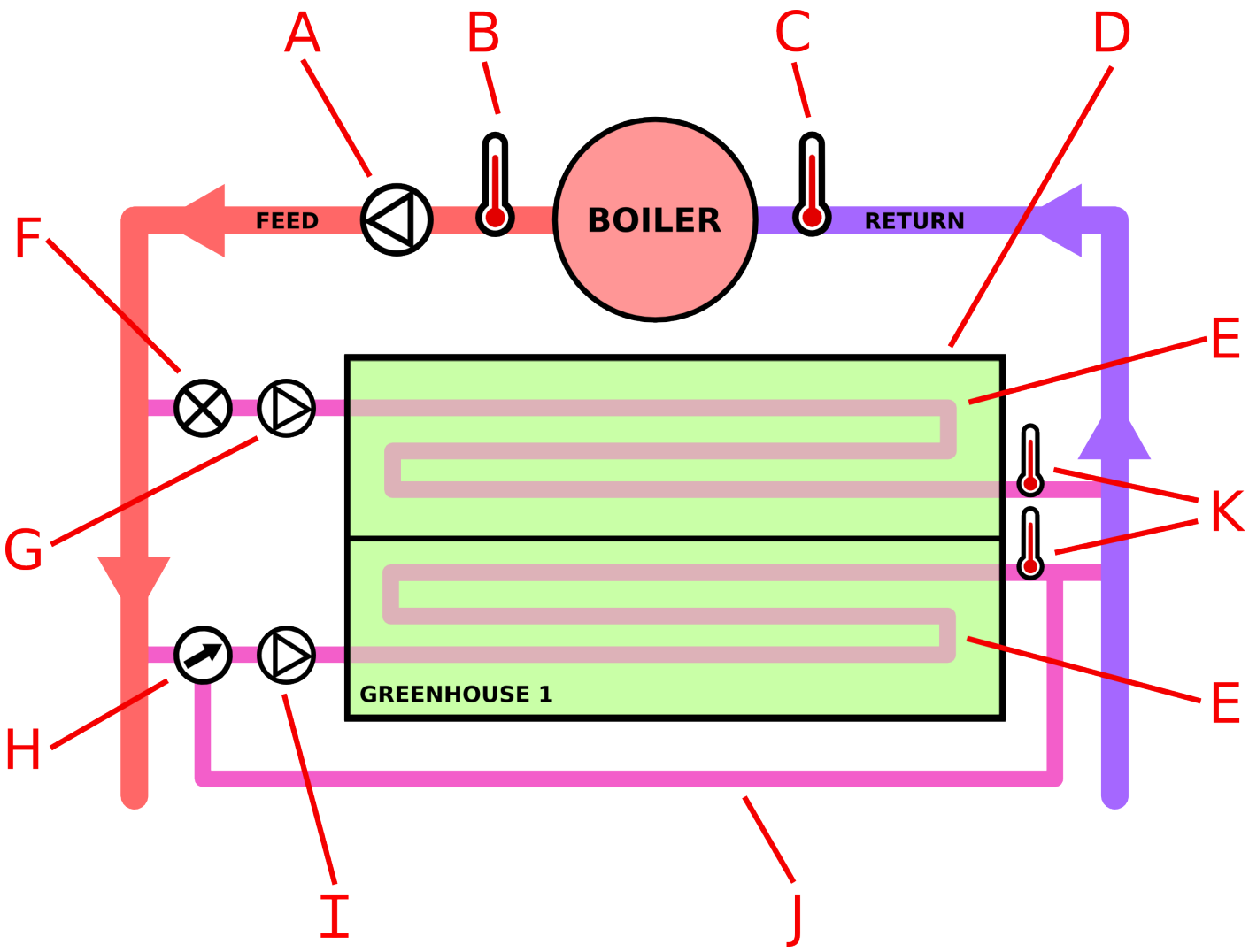
Each heater translates to a specific heating coil in the compartment (**E** in the diagram below). Some of these fields will likely be confusing without visualizing how the hydronic system is laid out:



Annotation	Name	Description
A	**Ring Main Pump**	This is the main pump that runs the boiler water throughout the ring main system, and is not controlled by the Multigrow
B	**Feed Temperature Sensor**	The feed temperature sensor mapped to the **Feed Sensor Input** in the Ring Main configuration
C	**Return Temperature Sensor**	The return temperature sensor mapped to the **Return Sensor Input** in the Ring Main configuration
D	**Compartment**	The compartment that the heaters affect
E	**Hydronic Heater**	The North and South Heater pipes that the boiler water runs through
F	**North Heater Stop Valve**	When an "*On Off*" **Valve Type** is used, the Multigrow will open the valve (using the address specified in **Output**), which will cause the pump to start running
G	**North Heater Zone Pump**	The pump that sucks water from the Ring Main into the hydronic heater. Specified by ticking the **Pump Installed** checkbox and entering an **Output** address
H	**South Heater Proportional Valve**	A proportional mixer valve that allows better control of the pipe temperature by recirculating the colder heater water
I	**South Heater Zone Pump**	The pump for this heater. When the valve is open the pump will be activated. Specified by ticking the **Pump Installed** checkbox and entering an **Output** address
J	**Re-circulation Loop**	The loop used to recirculate colder water back into the proportional valve for more temperature control. Not required unless a proportional valve is used
K	**Pipe Temperature Sensors**	The temperature sensor for the hydronic heater pipe. This is what hooks into the **Pipetemp Input** field above.

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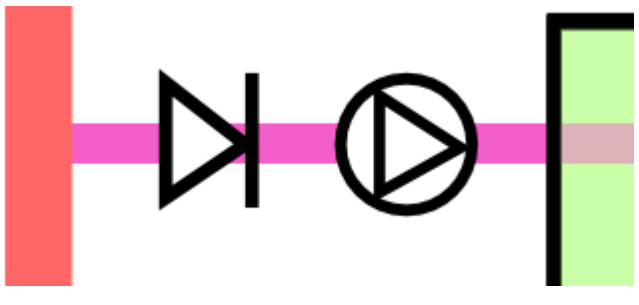
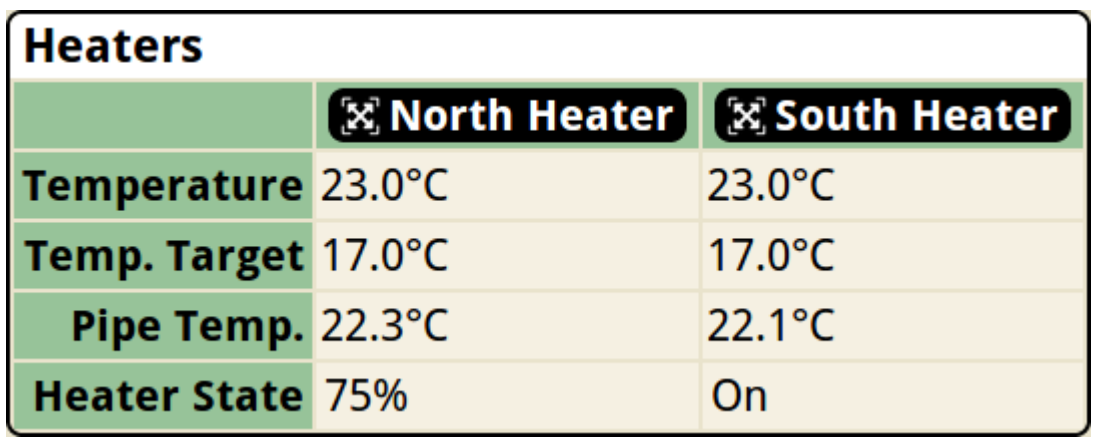
Using a Non Return valve instead of a Stop Valve



It is possible to use a non return valve instead of a stop valve, which can be cheaper. To configure this the **Pump Installed** should be unticked, the **Valve Type** set to "*On Off*" and the Valve **Output** should run the pump.

Settings

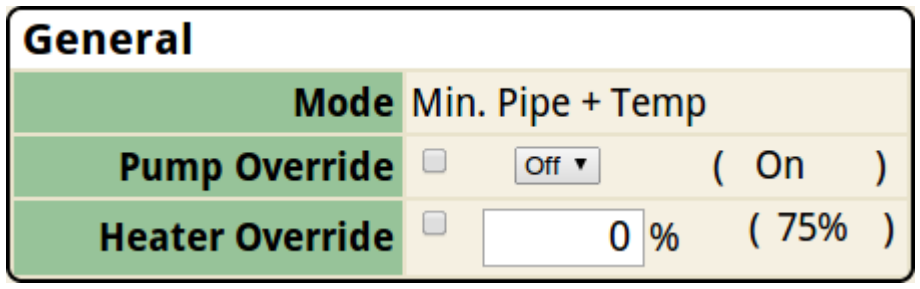
Navigating to **Settings > Climate > Tomatoes > Hydronic** will allow you to setup the control options for hydronic heating. By default the following summaries will be shown:



Field	Description
Temperature	The current temperature of the compartment
Temp Target	The target of this heater
Pipe Temp	The current pipe temperature
Heater State	The state of the heater, *On* (valve open/pump running) or *Off* (valve closed/pump not running) for On/Off type valves, or a percentage of heat for proportional valves (75% from Ring Main, 25% recirculated)

Clicking on the expander buttons will give you a lot of per heater control options to setup. They are explained below under subheadings for brevity.

General



Field	Description
Mode	Which targets the hydronic system is trying to maintain, one of: • *Min Pipe:* minimum pipe temperature • *Temp:* compartment temperature • *Min Pipe + Temp:* both compartment and minimum pipe temperature
Pump Override	When ticked, the pump will be overridden to the value in the dropdown box
Heater Override	When ticked the heater will be overridden to the value specified

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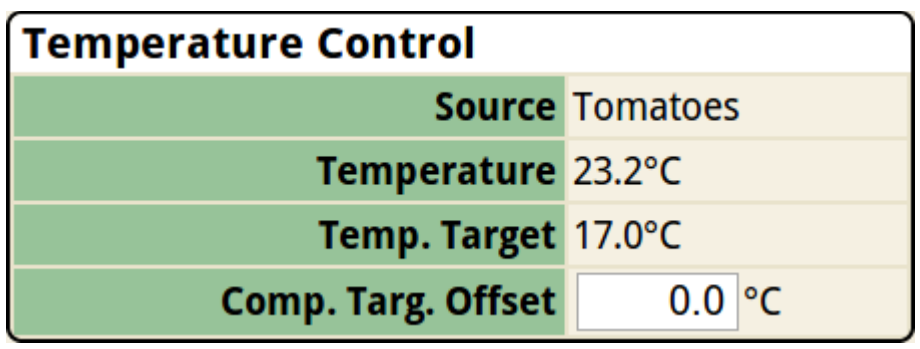
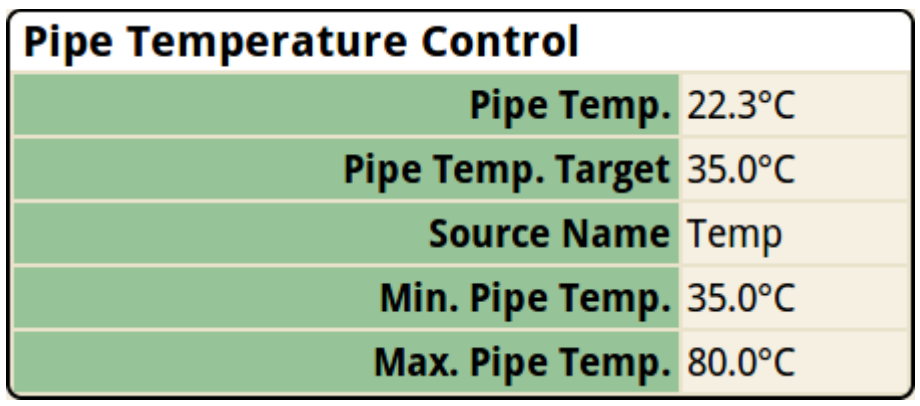
Temperature Control



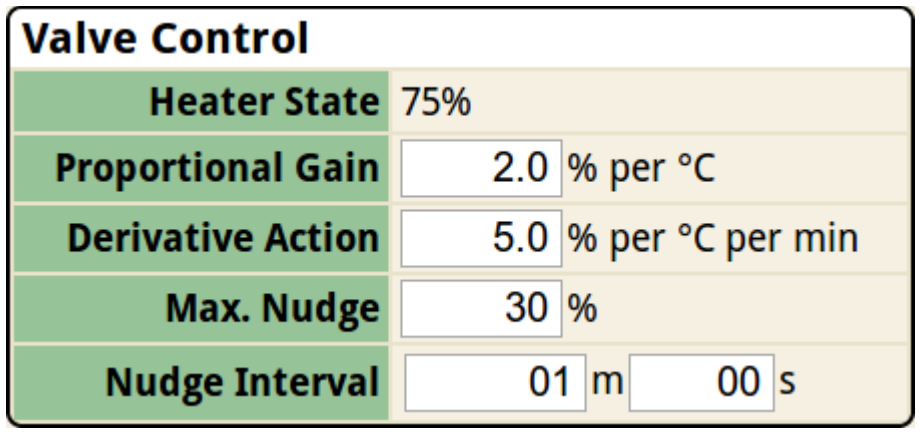
Field	Description
Source	The source for the sensor (in this case, the Tomatoes Compartment)
Temperature	The current compartment temperature
Temp Target	The heating target for this heater (by default, equal to the compartment heating target)
Comp Targ Offset	Offset the heating target for this heater by the value specified

Pipe Temperature Control



Field	Description
Pipe Temp	The current pipe temperature
Pipe Temp. Target	The pipe temperature target
Source Name	The pipetemp name as specified in the configuration
Min Pipe Temp	The minimum temperature the pipe should be
Max Pipe Temp	The maximum temperature the pipe should be

Valve Control (Proportional)



Field	Description
Heater State	The current heater state
Proportional Gain	The proportional gain for the valve
Derivative Action	The derivative action for the valve
Max Nudge	The maximum percentage to move the vent by every nudge
Nudge Interval	The time between each nudge

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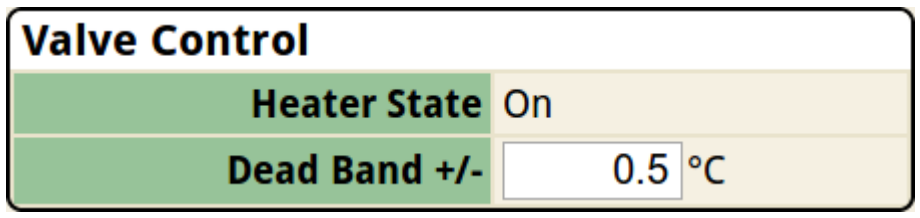
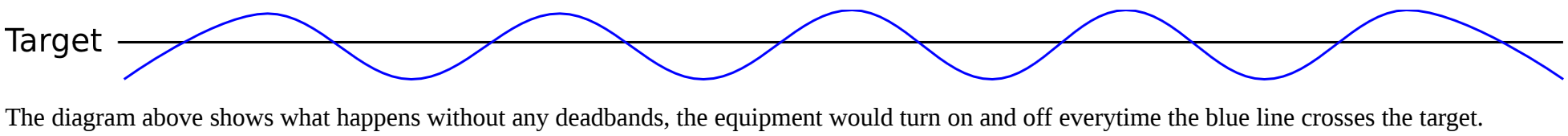
Valve Control (On/Off)



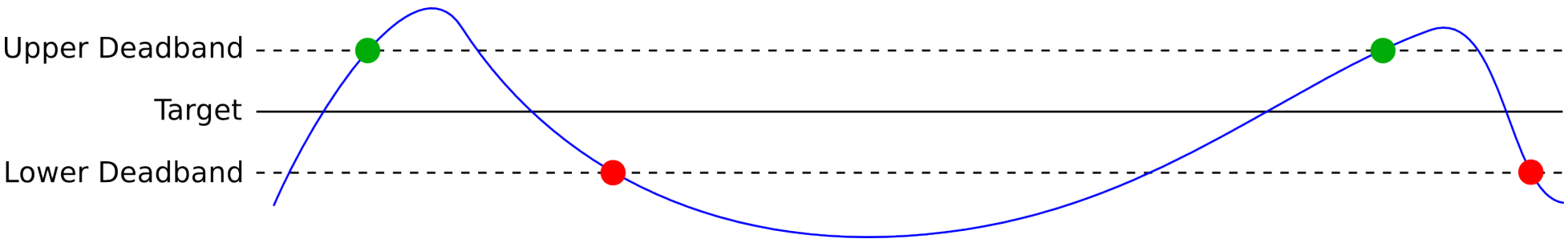
Field	Description
Heater State	The current heater state
Dead Band +/-	The temperature deadband for activating this valve

How Deadbands Work

The Multigrow allows setting deadbands on most configured equipment in the Settings section. Deadbands are used to prevent equipment turning off and on too often which can be damaging to the equipment.



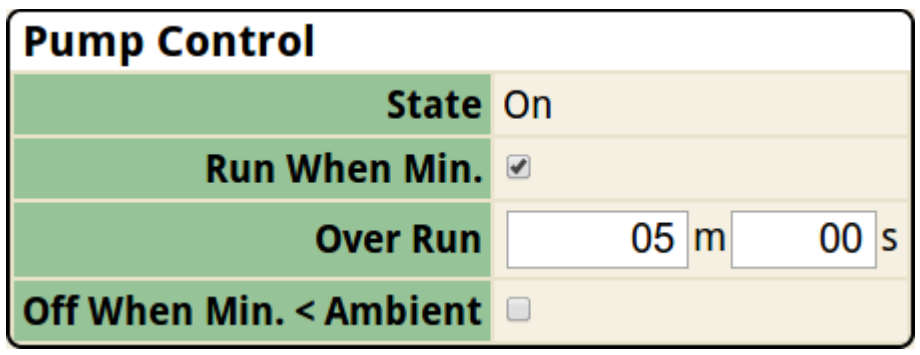
The diagram above shows what happens without any deadbands, the equipment would turn on and off everytime the blue line crosses the target.



However, as in the diagram above, the equipment only turns on at the green dots, and turns off at the red dots for the same amount of elapsed time. The deadbands allow the effect (such as cooling) to happen for longer so that a greater influence is felt keeping the line below the target for longer before the equipment needs to be powered up again. Note that some equipment will operate inversely, turning on at the red dots, and off at the green dots.

Pump Control

This section will not appear unless the **Pump Installed** checkbox has been ticked in the configuration section



Field	Description
State	The current state of the pump
Run When Min	Run the pump over
Over Run	Keep running for the specified amount of time after the heating demand disappears
Off When Min < Ambient	Turn the pump off when the minimum pipe temperature is less than the compartment temperature

Time Periods

The Time Periods section allows you to specify different settings for different time periods. For instance, disabling the temperature control during the day or specifying differing mix/max values for night and day.

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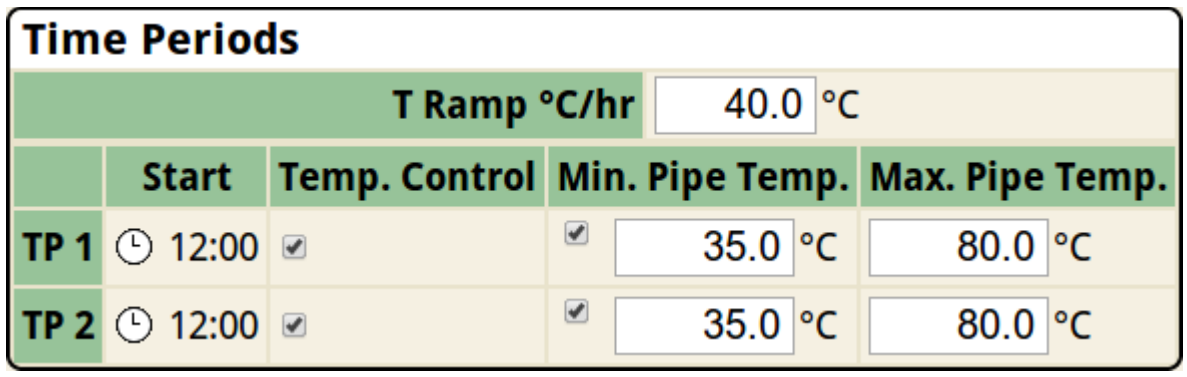
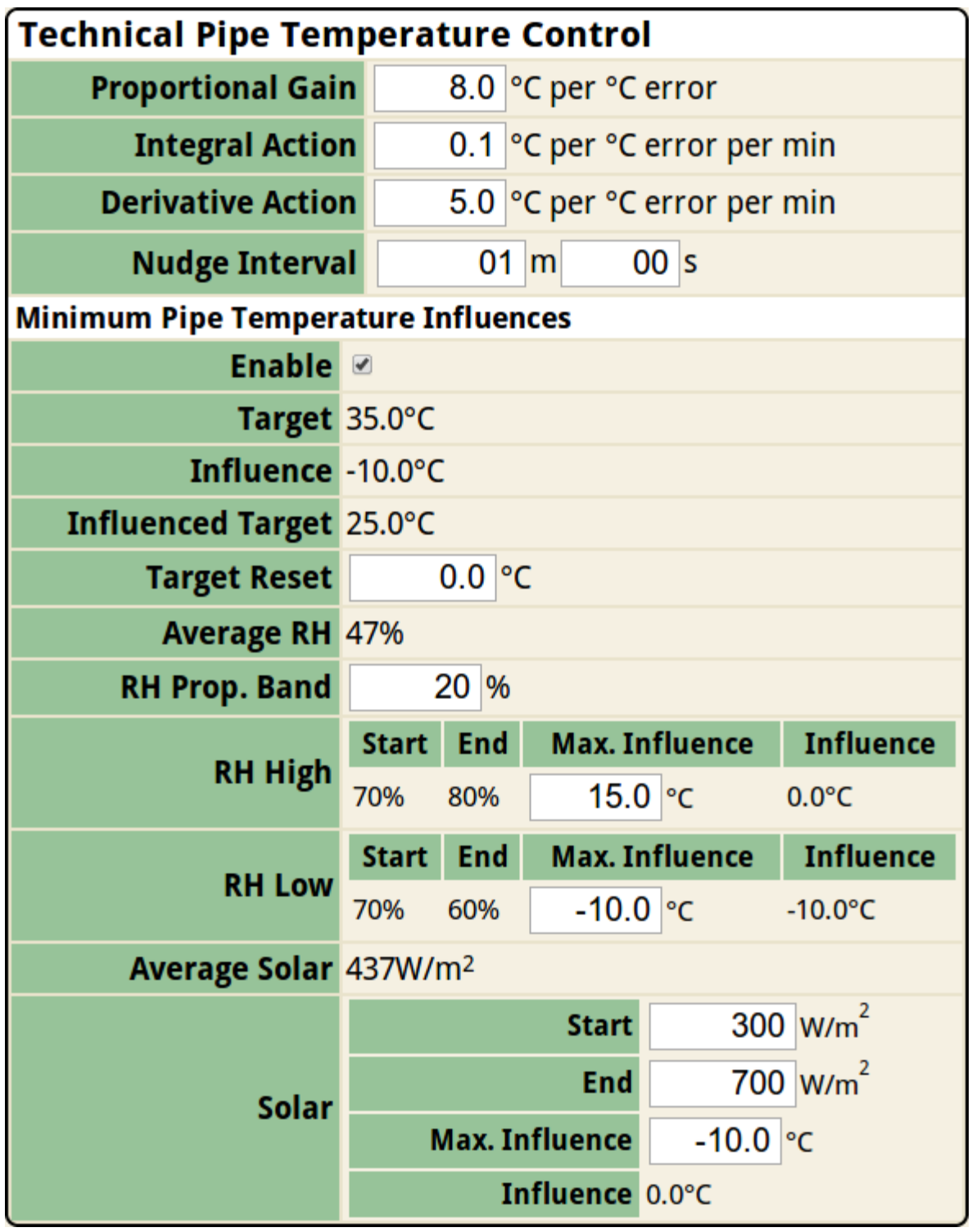


Field	Description
T Ramp °C/hr	The temperature ramp rate per hour (i.e. don't change the temperature more than 40° in an hour)
Temp Control	Enables temperature control via hydronic heating during this time period
Min Pipe Temp	The min pipe temp for this time period
Max Pipe Temp	The max pipe temp for this time period

Technical Pipe Temperature Control

This section has advanced settings for controlling the influences on pipe temperature.


Technical Pipe Temperature Control
Proportional Gain 8.0 °C per °C error
Integral Action 0.1 °C per °C error per min
Derivative Action 5.0 °C per °C error per min
Nudge Interval 01 m 00 s
Minimum Pipe Temperature Influences
Enable
Target 35.0°C
Influence -10.0°C
Influenced Target 25.0°C
Target Reset 0.0 °C
Average RH 47%
RH Prop. Band 20 %
RH High
Start End Max. Influence Influence
70% 80% 15.0 °C 0.0°C
RH Low
Start End Max. Influence Influence
70% 60% -10.0 °C -10.0°C
Average Solar 437W/m2
Solar
Start 300 W/m2
End 700 W/m2
Max. Influence -10.0 °C
Influence 0.0°C

Field	Description
Proportional Gain	The proportional gain. Determines how much to raise the pipe temp by depending on how far away from the heating target the compartment temperature is
Integral Action	The integral action.

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Field	Description
Derivative Action	The derivative action. Detects when the heating target will be met according to the rate of change and adjusts the pipe temperature depending
Nudge Interval	The time between nudges
Enable	Enable the influences on minimum pipe temperature
Target	The pipe temperature target
Influence	The current influence
Influenced Target	The target as adjusted by the influence - the working target
Target Reset	Reset the target to this value immediately. The target will then start creeping back to the working target
Average RH	The average RH in the compartment, used to determine RH influence on the pipe temperature. Using an average stops the pipe temperature being influenced too heavily by rapid changes in RH
RH Prop Band	The band over which to adjust the pipe temperature proportionally depending on the average RH reading
RH High	If the RH is too high, increase the pipe temperature to try to drive the wet air out. The **Start** value is the compartment RH target, at which point the **Influence** will be *0°C*. If the RH gets to the **End** value or above, then the **Influence** will be set to the **Max Influence** (in this case "*15°C*"). At half way between the **Start** and **End** values (*75%*) the **Influence** will be half the **Max Influence** (*7.5°C*)
RH Low	If the RH is too low, decrease the pipe temperature to try to increase the RH. The **Start** value is the compartment RH target, at which point the **Influence** will be *0°C*. If the RH gets to the **End** value or below, then the **Influence** will be set to the **Max Influence** (in this case "*-10°C*"). At half way between the **Start** and **End** values (*65%*) the **Influence** will be half the **Max Influence** (*-5°C*)
Average Solar	The average Solar RAD reading in the compartment, used to determine Solar influence on the pipe temperature. Using an average stops the pipe temperature being influenced too heavily by rapid changes in Solar RAD
Solar	If the solar is high enough in the compartment the pipe temperature target should be lowered so the compartment doesn't get too hot. When the **Start** value is exceeded the pipe temperature target will start to be proportionally influenced up until the **End** value and above where the **Influence** will be set to the **Max Influence** ("*-10°C*"). Halfway through the range (*500M/w²*) the **Influence** will be set to *5°C*

Readings

You can see the readings for the hydronic heaters by navigating to **Readings** > **Climate** > **Tomatoes** > **Hydronic**:

Heaters

	North Heate...		South Heater	
Valve Type	Proportional		On Off	
Temperature	21.2°C		21.2°C	
Pipe Temp.	35.6°C		36.9°C	
Min. Pipe Temp.	35.0°C		35.0°C	
Mode	Min. Pipe + Temp		Min. Pipe + Temp	
Heater	**Desired Pos.**	35%	**Desired Pos.**	Off
	State	Idle 35%	**State**	On
	Switch Pos.	Auto	**Switch Pos.**	Auto
	Fuse	OK	**Fuse**	OK
Pump	**Desired Pos.**	On	**Desired Pos.**	On
	State	Off	**State**	Off
	Switch Pos.	Auto	**Switch Pos.**	Auto
	Fuse	OK	**Fuse**	OK

Field		Description
Valve Type		The type of valve, *Proportional* or *On Off*
Source Name		The name of the temperature source (only shown if the temperature source is not the compartment)

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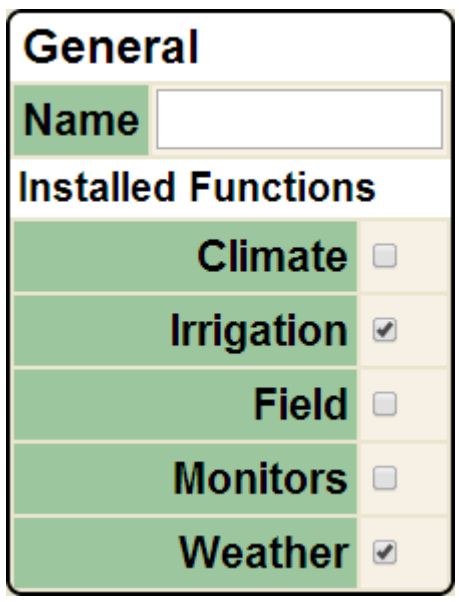
Field		Description
Temperature		The temperature of the compartment or source
Pipe Temp		The temperature of the pipe
Min Pipe Temp		The minimum pipe temperature
Mode		Which targets the hydronic system is trying to maintain, one of: • *Min Pipe:* minimum pipe temperature • *Temp:* compartment temperature • *Min Pipe + Temp:* both compartment and minimum pipe temperature
Heater	**Desired Pos**	The desired position of the valve
	State	The current state of the valve
	Switch Pos	The current switch position on the output module
	Fuse	The status of the fuse on the output module
Pump	**Desired Pos**	The desired position of the pump
	State	The current state of the pump
	Switch Pos	The current switch position on the output module
	Fuse	The status of the fuse on the output module

Irrigation

Installation

The very first step in setting up an irrigation system is to install irrigation control within the Multi system. This is done by ticking the appropriate box on the main system configuration page; you must be logged in at the correct user level to do this.



Once this option has been saved and activated, an Irrigation tab will appear along the primary menu of the system.

If outside solar or pETo triggering is to be used within the system, a weather station needs to be configured for the site for this information to be correctly fed into the system.

Cannot include /irrigation/summary/weather/installation - does not exist yet

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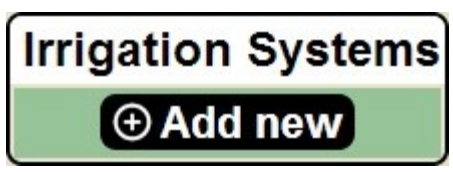
Summary

Configuration

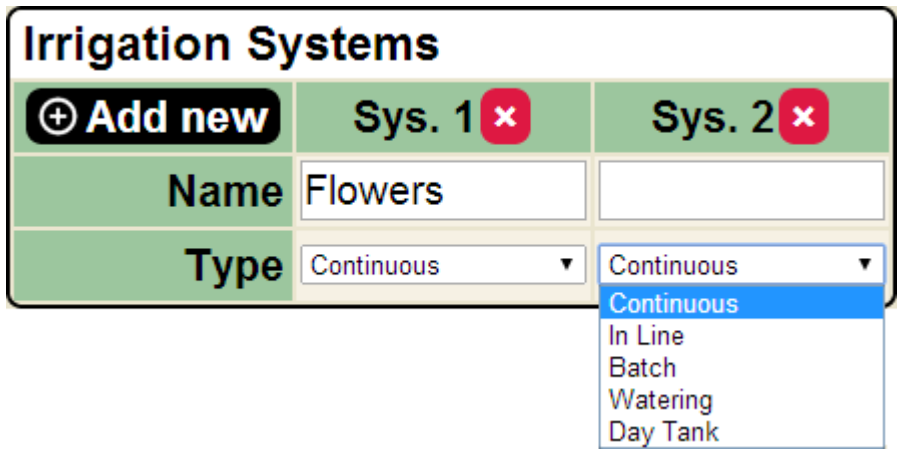
Adding a new irrigation system

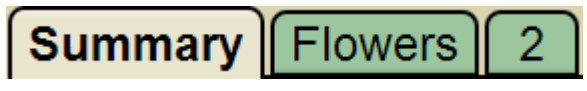
Navigating to the irrigation tab under the configuration page will bring up the summary page. This is a summary of all irrigation systems configured for the Multi. Here systems can be added or removed as well as the system type changed.



Pressing the add new button will add a new irrigation system to the Multi controller. When a system is added the following options become available. The system will also be added to the irrigation secondary menu. Pressing the red X button on any already installed systems will remove it.

> If you remove an irrigation system save and activated, this will remove all the configuration within the system from the Multi. Even if the system of the same number is added back this will be a new blank irrigation system. Please ensure that when removing a system the loss of all the information within that system is acceptable.





Name: This is a unique name given to the system this name will also be displayed along the irrigation top menu, If this name is left bank the system number will be displayed here instead of the name. The name itself does not effect the control of the system in anyway it is merly used to differentiate each irrigation system. It is helpful to give names that hold some meaning, where it be type of system (Continuous, Batch, etc), physical location (North Shed, Prop House, etc) or type of crop (Flowers, Tomatoes, etc). These are just example the name can be anything that helps you identify the system.

Dose Type: This sets the dose type of the system. Various irrigation system required differing components, selection of the correct dose type needs to be made here in order to properly configure the system.

- ***Continuous:*** A continuous dosing system is used to continuously correct the nutrient and pH levels of a tank, this system is not used in conjunction with any automated watering of plants. A continuous system dose not have any control over the filling of a tank either.
- ***In Line:*** in line dosing system is used to water plants with a specific nutrient and pH level. In order to obtain this level dosing valves are used to inject directly into the water as it travels to the plants.
- ***Batch:*** A batch system is a dosed tank system similar to continuous but the filling control is done by the Multi it also controls the watering side of the irrigation.
- ***Watering:*** A watering system purely controls watering to the plants, there is no dosing on a watering system.
- ***Day Tank:*** A day tank system continuously doses a tank to certain levels but has no control of the filling, it also control watering to the plants. A Day tank system is a combination of both a continuous system and a watering system.

Main Tanks

Main Tanks are water source tanks that are shared between irrigation systems. If only on irrigation system is being used or each system has it's on self contained water tank then main tanks do not need to be used.

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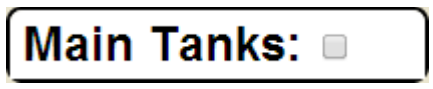
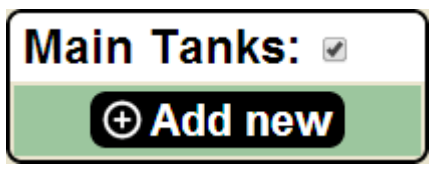
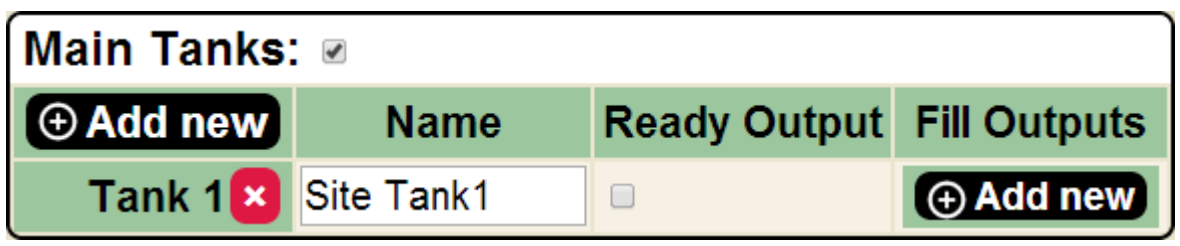
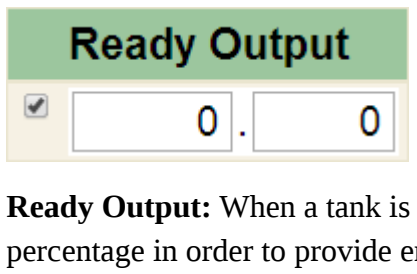


Ticking the box will enable main tanks to be added to the Multi.

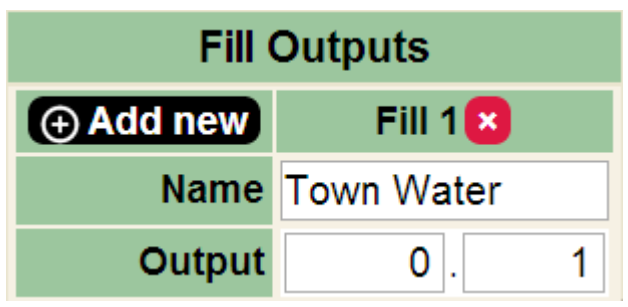




Name: A name can be assigned to each site tank in order to identify it easier. Like the Irrigation system name this have no affect on the control.



Ready Output: When a tank is suffiecently full it can be demeed ready. This may not neccarily be when the tank is completely full but a certian percentage in order to provide enough water for normal opertaion. This level is set under the settings for a main tank. Ticking the box will enable an output expander address to be assigned as the ready output for this tank. While the tanks is ready this output will be driven on.

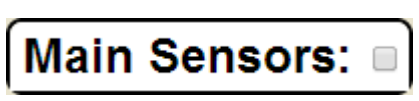


Fill Outputs: In order to control the filling of a water tank it must be assigned fill outputs. A single tank can have multiple fill inputs to it.

- **Name:** A unique identifier for a particular fill output.
- **Output:** The address of the output that is driven when this fill input becomes active.

Main Sensors

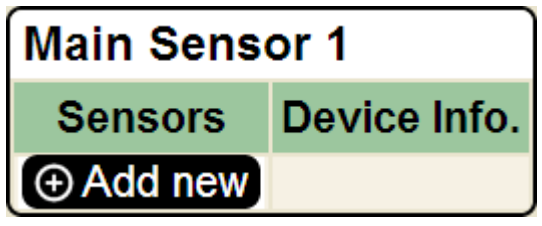
If main tanks are being used then a main sensor needs to be install this is used to fed the tank level sensor into the main tank.



Ticking this box will bring up the sensors tab on the secondary menu.

Navigating the the sensor page three individual groups of Irrigation sensors (Remote EpM's) can be configured. Each Main sensor is made up of the average of any number of individual Remote EpM sensors.

Main Sensor 1



After adding a new Remote EpM to the sensor box the Sensors field and the device info. box will change.

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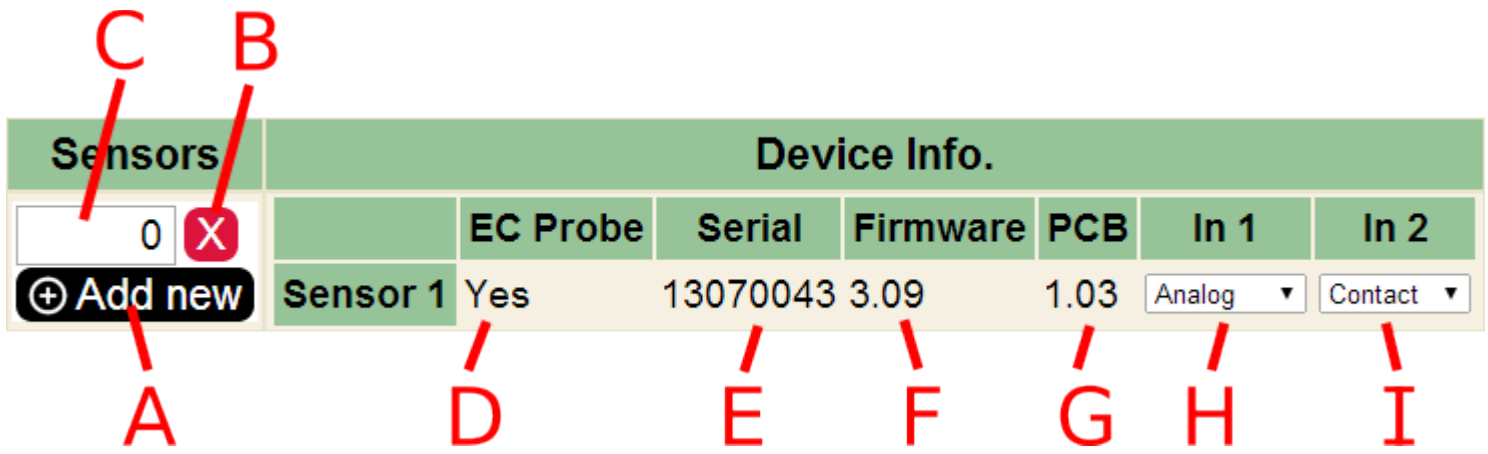
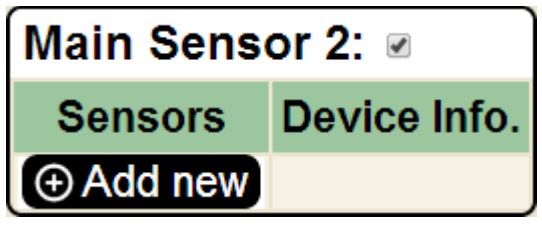


Annotation	Name	Description
A	**Add new button**	Adds an EPM sensor
B	**Delete button**	Deletes an EPM sensor
C	**Sensor address**	The address of the sensor. Each box must be populated with the corresponding address of the EpM device
D	**EC Probe**	Does the Remote EpM currently have an EC Prove attached?
E	**Serial**	Serial number of the device connected under that address
F	**Firmware**	Current version of the firmware this device is running
G	**PCB**	PCB version of the device
H	**In1**	• **Contact:** Input 1 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to 5 - 10V when contact is made • **Analog:** Analog voltage is connected to input 1 of sensor • **Moisture:** Moisture probe is connected to Input 1 of sensor
I	**In2**	• **Contact:** Input 2 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to ground when contact is made • **Flow:** Input 2 is a flow meter input, again this should be pulled to ground when contact is made for correct operation

Sensor information is only available once the configuration has been activated by pushing the **Activate** button

Main Sensor 2 & 3

Main sensors 2 and 3 are configured exactly the same as sensor 1 they just must have the installed tick box ticked before the add new functionality is available.



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Settings

Irrigation Systems

Irrigation Systems

	Batch	Cont	Inline	Water	Day Tank
Type	Batch	Continuous	Inline	Watering	Day Tank
Irrig. State	Waiting Empty	Waiting	Waiting	Waiting	Waiting
Dose State	**Nutr.** Waiting **pH** Waiting	**Nutr.** Waiting (Stir) **pH** Waiting (Stir)	**Nutr.** Disabled (No Sensor) **pH** Disabled (No Sensor)		**Nutr.** Out of Range **pH** Out of Range

The summary setting spage contains a snap shot of all irrigation systems currently configured on the system and what states they are in.

Type: The type of system that has been configured using the same named variable on the configuration page.

Irrig. State: The current state of the system this can vary widely based on the type of system configured.

Dose State: The current state of the dosing system.

Main Tanks

Main Tanks

	Source	Percent	Level	Ready	Error
Site Tank 1	Main Sensor 1	9%	90L	No	No

Source: Current source select for the tank level sensor.

- ***Main Sensor 1, 2 or 3:*** Selects either of the main system sensors as the analog voltage source for the tank.
- ***Irrig. Sensors:*** The analog voltage for the tank level comes from a sensor configured with an irrigation system. If this is selected the setting must be saved before the additional options for configuring the source are available.

Source	Irrig. System	EpM Sensor
Irrig. Sensor	2	Measure

Irrig. System: The number of the irrigation system that the desired sensor is installed into.

EpM Source: Which one the groups of sensors is providing the analog voltage; Measure, Check or Source.

Pressing the black button which the name of the tank and the expansion icon will dipslay the rest of the tank settings.

Tank Readings

Tank Readings

Curr. Voltage	1.438V
Curr. Level	25% (250L)
Ready	No
Error	No

Curr. Voltage: Displays the current Analog voltage level being report by the specified voltage source.

Curr. Level: Based on the settings of tank, Empty Voltage, Full Voltage and Tank Size the current level of the tank in percentage and litres will be calculated and displayed here.

Ready: Is the tank currently ready, this means that the tank is at a suitable level to be useful for it's general purpose uses.

Error: Has an error occured in the tank, this is only true when the incoming analog voltage is below the empty voltage level or there is no voltage

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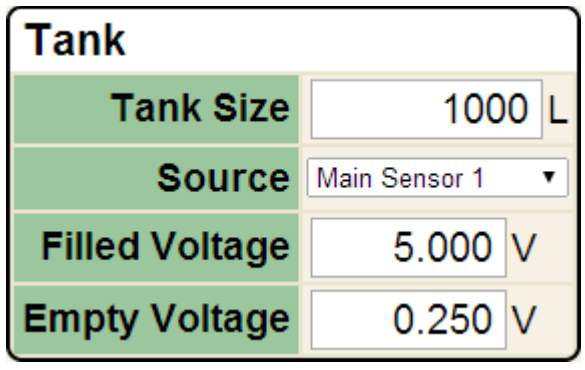
reading from the sensor at all (XX V)

Tank



Tank Size: Size of the tank being used for batching, this is not crucial to the control of the tank as the voltage readings determine the actual tank level. This is more for user feed back of the tanks exact level.

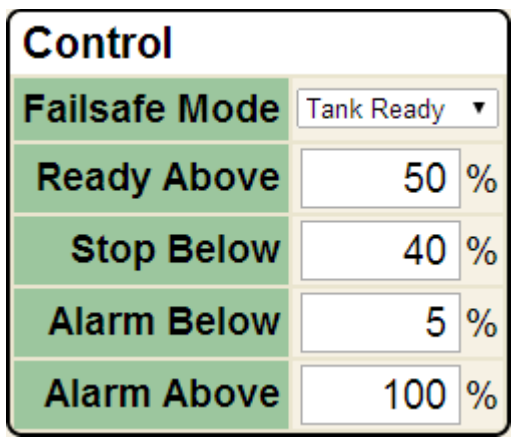
Voltage Source: The Remote EpM group the tank level sensor is being reported to.

- ***Measure:*** The tank level sensor is connect to a Remote EpM under the Measure Group.
- ***Check:*** The tank level sensor is connect to a Remote EpM under the Check Group.
- ***Source:*** The tank level sensor is connect to a Remote EpM under the Source Group.

Empty Voltage: When the tank is empty enter the value being displayed under Curr. Voltage into this field.

Filled Voltage: When the tank is full enter the value being displayed under Curr. Voltage into this field.

Control



Failsafe Mode: This mode is used to determine where the tank should be ready even if there is an error present. If a tank is not ready it will stop the systems ablitly to water and dose so is sometimes advisable to ignore the error to prevent this from happening.

- ***Tank Ready:*** When the voltage reading is completely lost or drops below the empty level, this will still say the tank is ready. Note the tank will still obey the Ready above setting is the voltage is present this is not an always ready option.
- ***Tank Delay:*** If an error has a occurred the tank will become unavailable and delay the irrigation system from running normally.

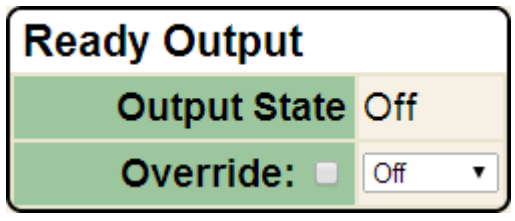
Ready Above: When the tank is filled above this level the tank will become ready.

Stop Below: When the tank drops below this level is it not ready.

Alarm Below: If the tank level drops below this level an alarm event will be generated.

Alarm Above: If a tank goes above this level an error event will be generated. A tank should never be able to get about 100% full if this happens the means the configuration could be out or the sensor faulty. This alarm is mainly to advise you to check the tanks overall setup.

Ready Output



Output State: Current state of the tanks ready output.

Override: Ticking this box will overrdie the output to position set. Refer to section blah for more information of output overides. Note this box will only be visible if a ready output has been configured.

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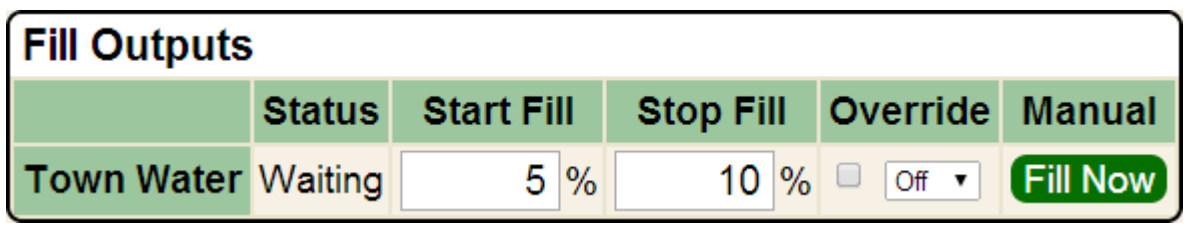
Fill Outputs



Status: Current status of the fill output,

- Define states here!!

Start Fill: Tank level at which this particular output will start filling.

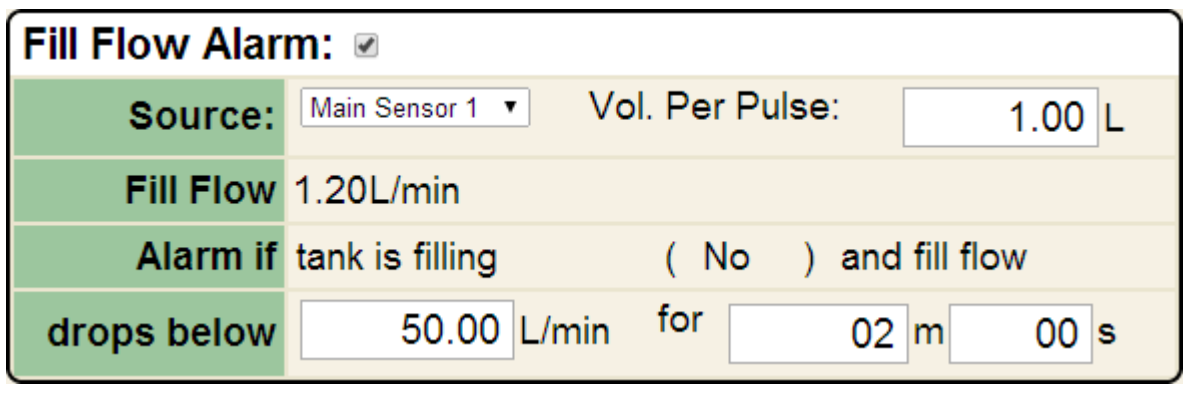
Stop Fill: Tank level at which this output will turn off.

Override: Ticking this box will overrdie the output to position set. Refer to section blah for more information of output overides.

Manual: Triggers an instand fill cycle on this output, the tank level might be below the stop fill but has not dropped enough for this output to become active. This will start this output manual until the tank has reached the Stop Fill level.

Fill Flow Alarms

Ticking the box will enable the configuration of a fill alarm on the tank.



Source: Current source select for the fill flow sensor.

- ***Main Sensor 1, 2 or 3:*** Selects either of the main system sensors as the flow source for the fill inputs.

Vol. Per Pulse: The amount of flow a single pulse form the flow sensor has measured. This should be specified by the manufacture of the flow sensors.

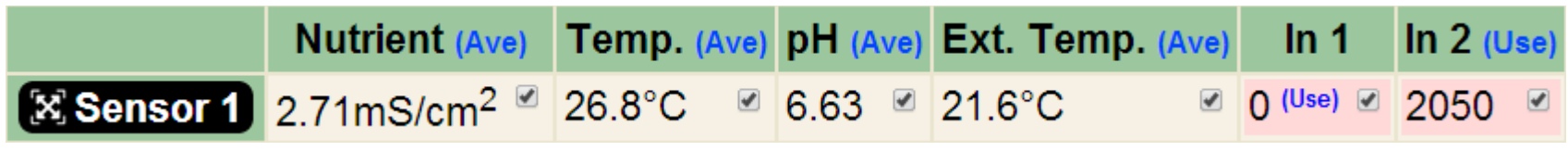
Fill Flow: Current flow being measured on the flow sensors.

Alarm conditions: The alarm conditions are specified in the last two boxes if the tank is currently filling the alarm conditions will be checked. If the flow drops below the L/min value set here for the time specified, alarm conditions will be meet and an alarm generated.

Main Sensors

If main sensors are install there setting can be found on the Senosrs tab along the secondary menu of the irrigation section. All the main sensor groups contain the exact same settings for each EpM.

Overview



The black button that appears in the row heading of the table is an expansion button, this button is given the name of the sensor number added to the system. When this button is pushed additional settings for each sensor will be displayed.

Field	Description
Nutrient	The current nutrient reading from the sensors. If this reading is 0.00 or XX check the connection of the EC probe to the Remote EpM sensors.
Temp.	Each Autogrow EC probe contains a temperature sensors which temperature is displayed here.

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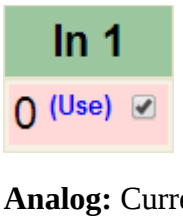
Field	Description
pH	Current pH being measured by the probe. Note that due to the nature of a pH measurement even without a probe connected a value can be displayed here.
Ext. Temp.	Current temperature being measured using the pipe temp sensor wired into the Temp pin of the Sensors B Connector. If a probe is not installed this temperature will appear of XX if a sensor is installed and XX is being displayed check the wiring of the probe.

In 1 & 2 Values

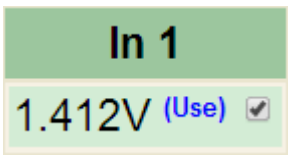
The values displayed in the Input 1 & Input 2 space will differ based on the In 1 setting on the configurations page, this needs to be set correctly to match the desired input signal. Since the type of variable can differ with the same column in the table each specific type of reading will be displayed in a different colour within the cell.

In 1:

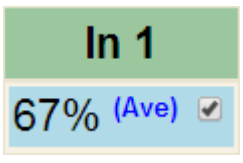
- **CC Count 1:** Current count to contact closure input wired into Moist pin on connector B, the Contact options must be selected under configuration for this to be displayed.



- **Analog:** Current analog voltage being measured by the sensor. This will only be displayed if the sensors In1 value on the configuration page is set to Analog.

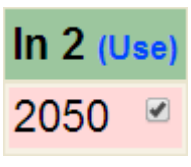


- **Moisture:** Current moisture level being measured by the sensors, the moisture option must be selected under configuration for this to be displayed.

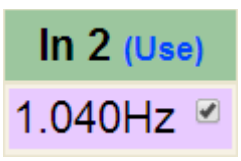


In 2:

- **CC Count2:** Current count of the CC input on the senosrs, this will only be displayed when contact option is selected under the In2 setting on the configuration page.



- **Flow Rate:** The raw flow rate in Hertz (frequency) that is being measured on the sensors. This is in relation to how many pulses a second the sensors is receiving (1 Pulse a second = 1 Hz). The Flow rate option must be selected under the In 2 setting on the configuration page for this to be displayed.



(Ave) Some or all of the above values are Average Vars.

The addition of the above text and tick box means a variable is part of an averaged set. If the tick box is ticked this means the current reading and all other tick ones will be averaged together. This is useful in order to gain on overall sample of a particular reading. Any invalid readings (e.g. *XX°C*) are omitted from the average even if the box is ticked.

(Use) Some or all of the above values are Use Me Vars.

The addition of the above text and tick box means a variable is part of an use me set. If the tick box is ticked this means the current reading will be used as the main reading from the group of sensors. This is useful when multiple sensors within a single group are installed but only one is used for the specific reading. If multiple of the same use me vars are ticked, the system will use the value from the lowest sensor number as the reading (e.g. *Sensor 0 RH* will be used over *Sensor 1 RH*).

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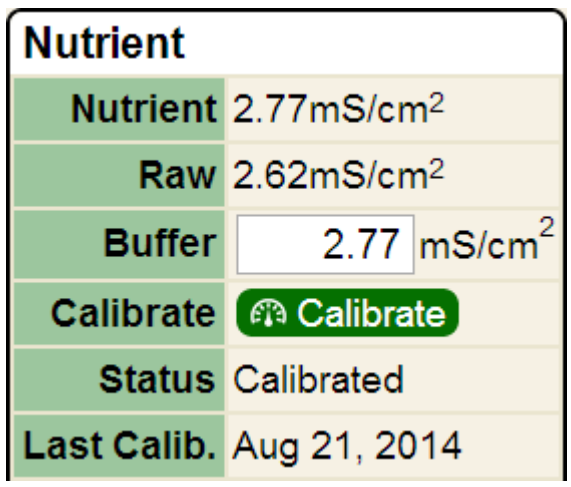
Additional Options

Each sensor can be individually calibrated in order to achieve the most accurate readings. Pressing the See All button will return you to the sensors overview page where other sensors additional options can be navigated to.

Nutrient

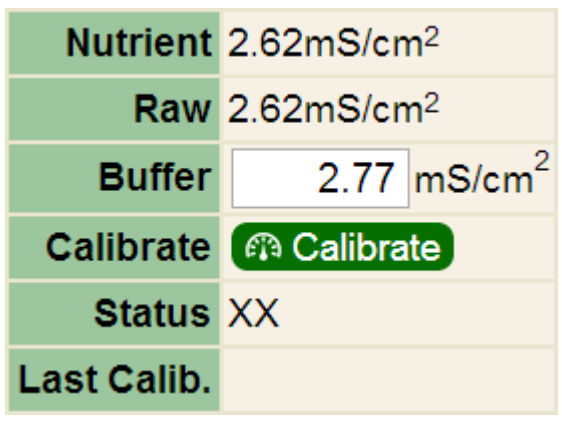


Field	Description
Nutrient	Current value of the nutrient, this is the value after the reading has been passed through the calibration it is the one that will be added to the average.
Raw	This is the raw reading coming from the sensor before calibration. This can differ from calibrated reading by quiet a lot. This value is displayed in order to give an indication of whether a new calibration should be performed.
Buffer	This is the calibration solution being used, default is 2.77mS/cm^2. This value can be changed to any value of buffer solution.
Calibrate	Pressing the Calibrate button will calibrate the current nutrient reading to the buffer solution set.
Calib	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Nutrient Calibration Procedure

For each Remote EpM sensor within a group that is to be used for nutrient measurement it is recommended to calibrate the probes once a month.

- Clean & rinse the nutrient probe face
- Place the probe into the calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.



- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the nutrient and the temperature to stabilize (Recommended 5 Minutes).

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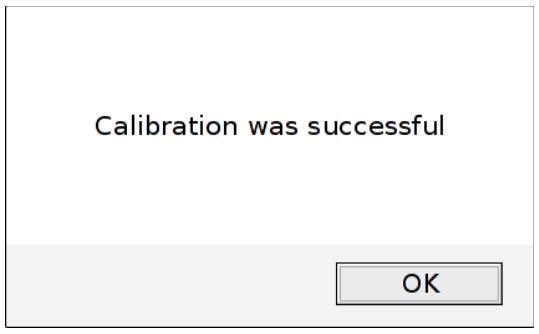
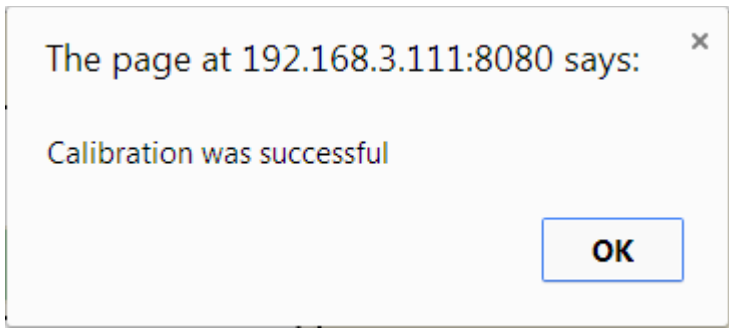
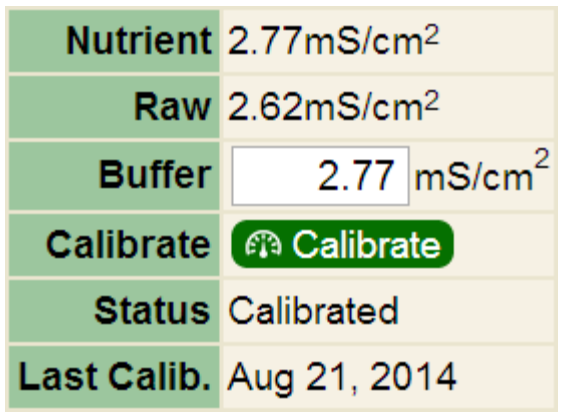


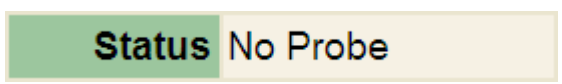


- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

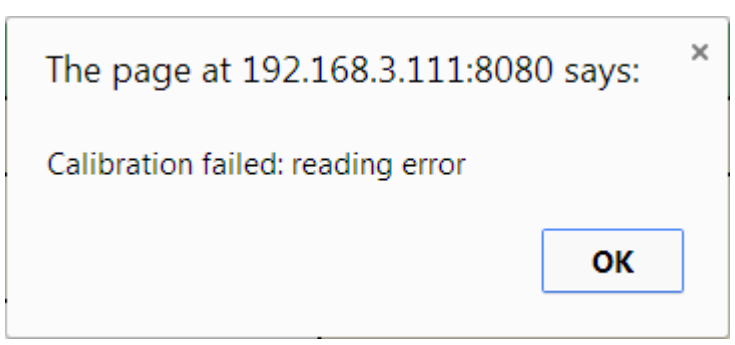


Calibration Errors

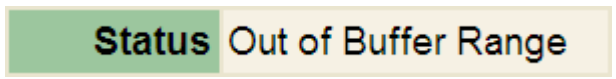
- **No Probe**



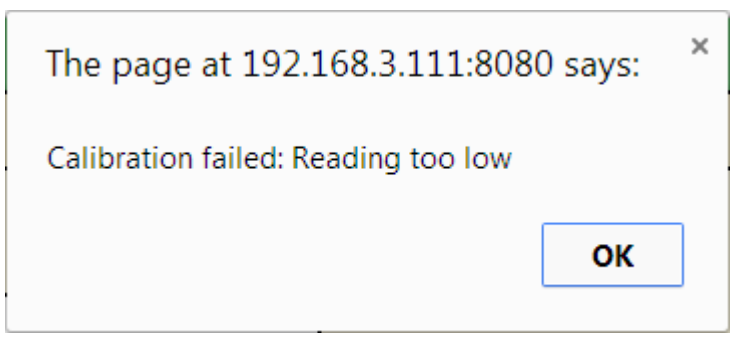
No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.

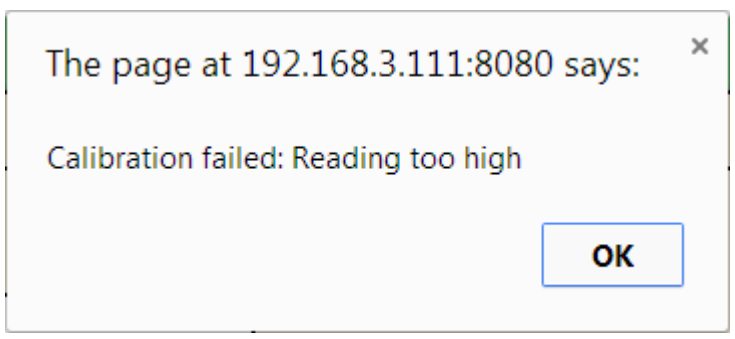


- **Out of Range**



Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.





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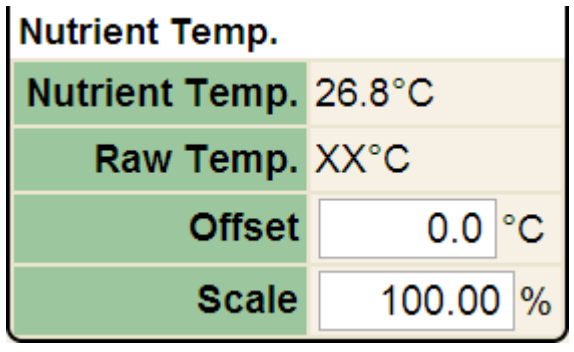
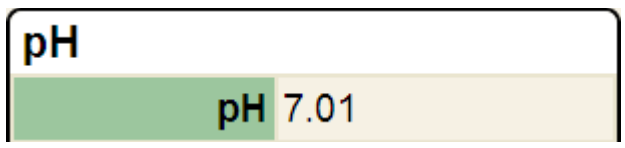
Nutrient Temperature



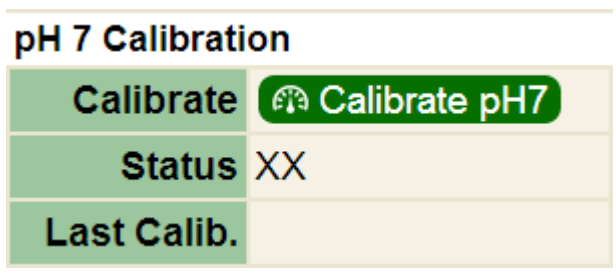
Field	Description
Nutrient Temp.	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

pH



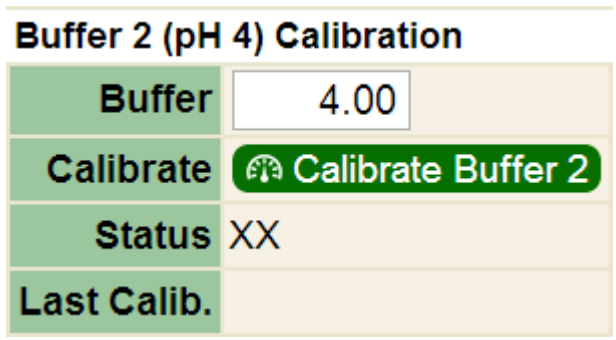
Field	Description
pH	Current pH value being reported by sensor.

Buffer 1 pH 7



Field	Description
Calibrate	Pressing this button will start a pH7 calibration.
Status	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Buffer 2 (pH4)



Field	Description
Buffer	pH value of the second buffer used in the pH calibration, this is usually a pH buffer of 4 but can be any other different pH level solution.
Calibrate	Pressing this button will start the second buffer calibration.
Status	Displays calibration information about the sensor.
Last Calib	Display the last calibration date for the sensor.

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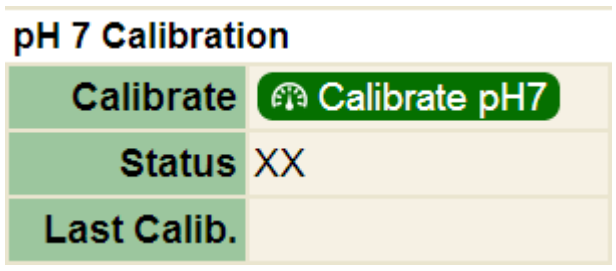
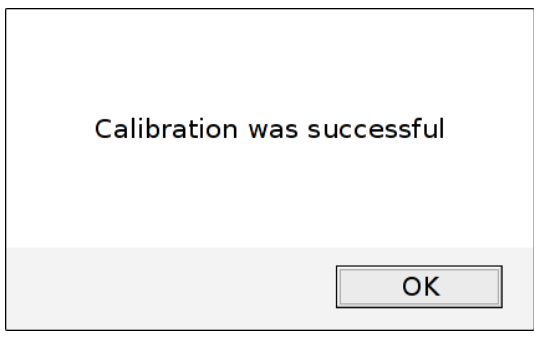
pH Calibration Procedure

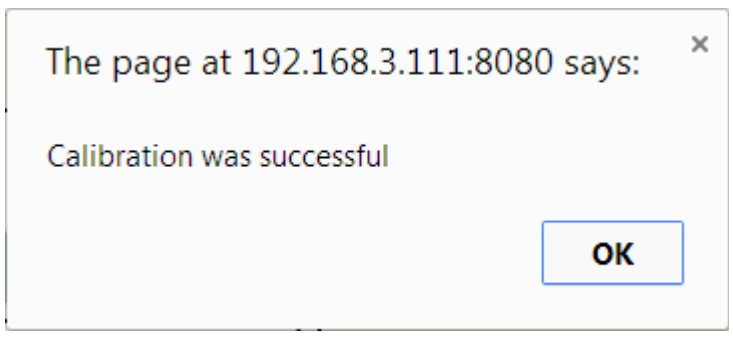
For each Remote EpM sensor within a group that is to be used for pH measurement it is recommended to calibrate the probes once a week to compensate for aging electrodes.

- Rinse the pH Electrode in fresh water.
- Place the probe into the pH 7 calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

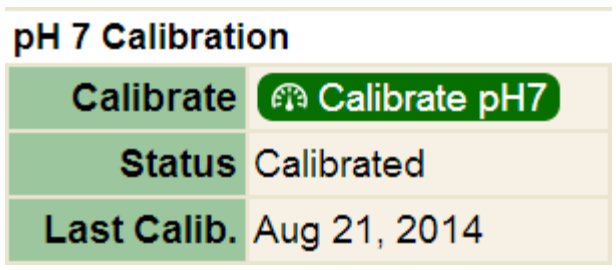


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).

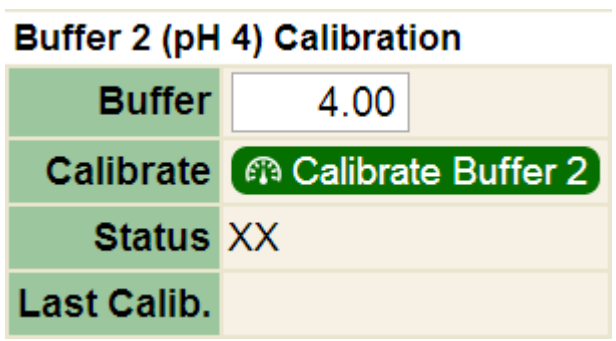




- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- Press the activate button before moving on to the second point calibration (pH 4).
- After a successful calibration the Calib message and time will be updated.



- Rinse the pH Electrode in fresh water.
- Place the probe into the second (pH 4) calibration solution.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.



- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).

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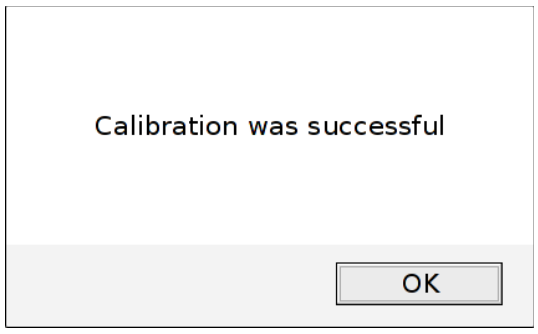
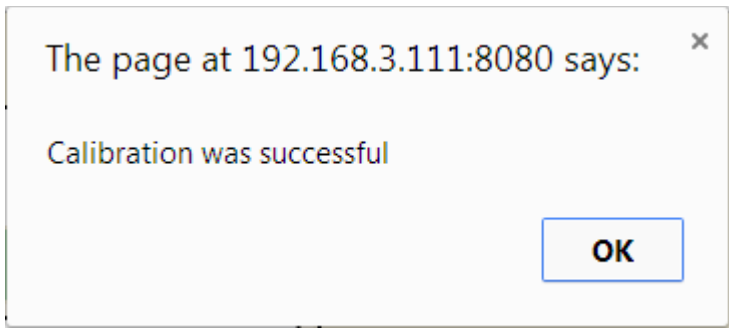
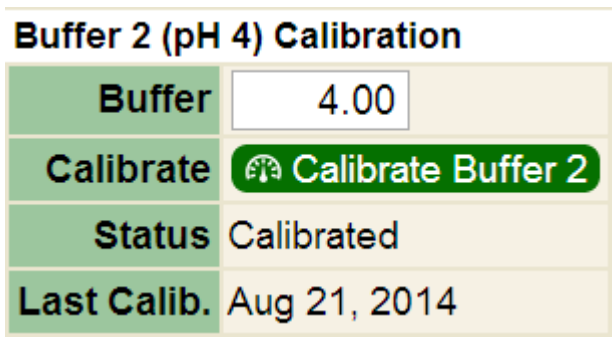


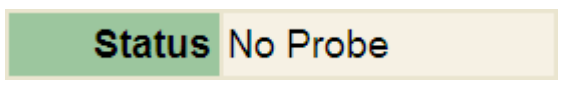


- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

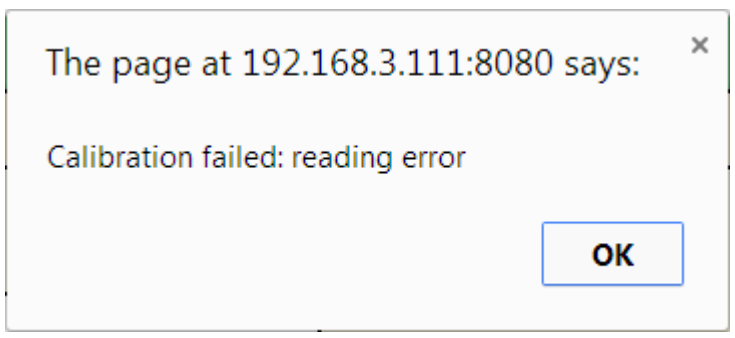


Calibration Errors

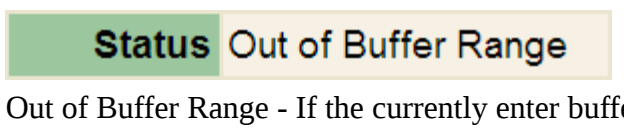
- **No Probe**



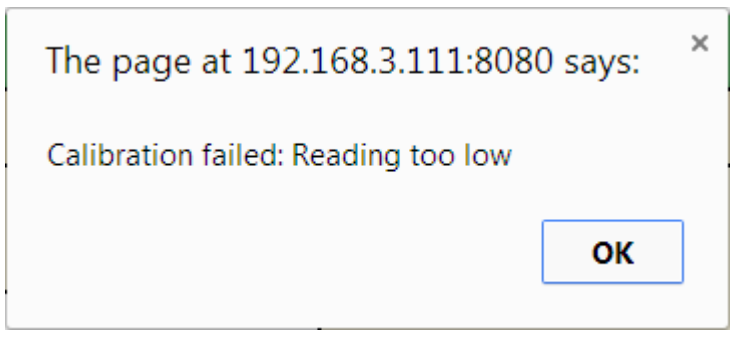
No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.

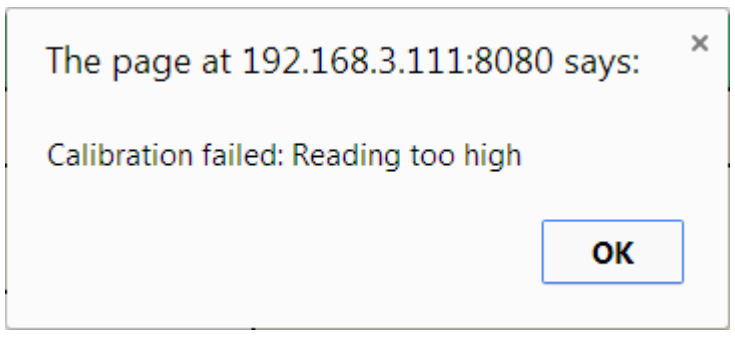


- **Out of Range**



Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.





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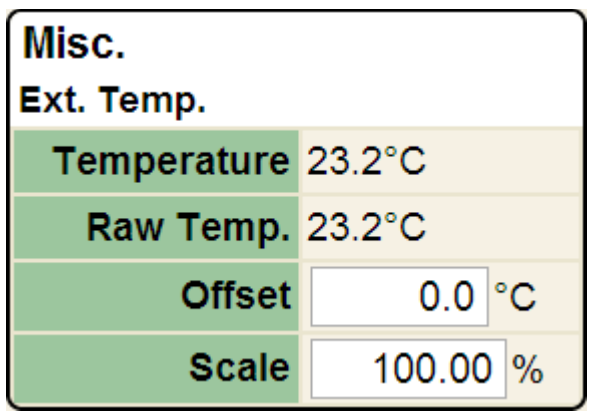
Misc.

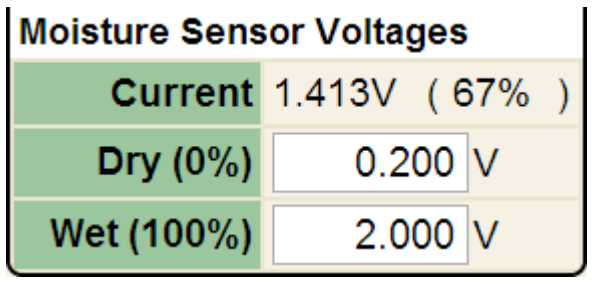
External Temperature



Field	Description
Temperature	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

Moisture

The moisture probe options box will only appear if the input 1 type has been selected under the configuration page.

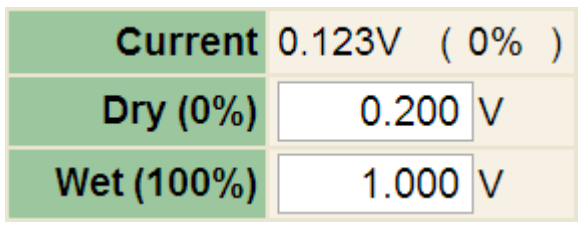


Field	Description
Current	Current voltage being measured by sensors from the moisture probe.
Dry (0%)	Voltage when probe is completely dry.
Wet (100%)	Voltage when probe is completely wet.

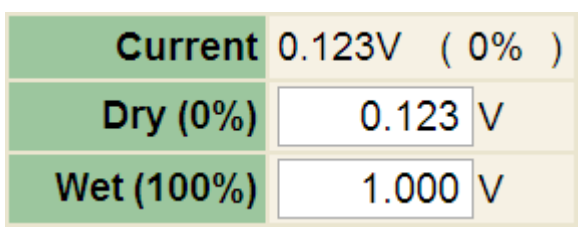
Moisture Probe Calibration Procedure

For each Remote EpM sensor within a group that is to be used for moisutre measurement it is recommended to calibrate the probes before using them, this usually only needs to be done once for a probe.

- First make sure the probe is completely dry.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate. And navigate to the Moisture Sensor Voltages box, note this will only be visible if the Input 1 type has been set to Moisture on the configuration page.



- Set the Dry setting value to match the current voltage being read from the sensor.



- Place the probe in to a glass of water, this is to ensure 100% wet of the probe for accurate calibration.

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- Set the Wet setting value to match the current voltage being read from the sensor.

Current	1.393V (100%)
Dry (0%)	0.123 V
Wet (100%)	1.393 V

- Once these two settings have been enter, save and activate the settings to complete the calibration.
- Once completed the probe can be placed into desired media for normal operation.

Current	0.564V (35%)
Dry (0%)	0.123 V
Wet (100%)	1.393 V

Use Factory Defaults

Use Factory Defaults

Reset	Reset Now
Clear CC 1 Count	Clear Now
Clear CC 2 Count	Clear Now

Field	Description
Reset	Pressing this button will reset all calibration constants for Nutrient and pH. This button will not effect the offset and scale settings.
Clear CC 1 Count	Manually reset the contact closure count of Input 1 back to zero.
Clear CC 2 Count	Manually reset the contact closure count of Input 2 back to zero.

Averages

Averages

Tick Box to Add Reading to Average

Nutrient	2.71mS/cm^2	☑
Nutrient Temp.	26.8°C	☑
pH	6.63	☑
Ext. Temp.	21.6°C	☑
Moisture	67%	☑

This box lists all values that are supplied by a Remote EpM senosrs that can be averaged together. This will display variables even if they are not selected as an input on the configuration page.

Reading Select

Reading Select

Tick Box to Use Reading

Analog	1.413V	☑
CC Count 1	0	☑
CC Count 2	60	☑
Flow Rate	1.040Hz	☑

This box lists all values that are supplied by a Remote EpM senosrs that can be select to be used as the main reading out of the set. This will display variables even if they are not selected as an input on the configuration page.

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Readings

Irrigation Systems

Irrigation Systems

	Batch	Cont	Inline	Water	Day Tank
Type	Batch	Continuous	Inline	Watering	Day Tank
Irrig. State	Waiting Empty	Waiting	Waiting	Waiting	Waiting
Dose State	**Nutr.** Waiting **pH** Waiting	**Nutr.** Waiting (Stir) **pH** Waiting (Stir)	**Nutr.** Disabled (No Sensor) **pH** Disabled (No Sensor)		**Nutr.** Out of Range **pH** Out of Range

The summary setting spage contains a snap shot of all irrigation systems currently configured on the system and what states they are in.

Field	Description
Type	The type of system that has been configured using the same named variable on the configuration page.
Irrig. State	The current state of the system this can vary widely based on the type of system configured.
Dose State	The current state of the dosing system.

Main Tanks

Main Tanks

	Site Tank1		
Source	Main Sensor 1		
Status	**Ready:** No **Error:** No		
Curr. Level	6% (60L)		
Ready Output	**Output State**	**Switch Pos.**	**Fuse**
	Off	Auto	OK
Fill Outputs		**Town Water**	
	Status	Waiting	
	Output State	Off	
	Switch Pos.	Auto	
	Fuse	OK	

If main tanks have been configured on the system their readings will appear here.

Field	Description
Source	Current main sensor the tank is using for it's level sensor.
Status	Is the tank as a water source ready, has an error been detected on this tank.
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Ready Output	If a ready output has been installed on the water source the outputs information will become visible here. Output State The current state of the output for this injector, On or Off. Switch Pos The switch position of this injectors output, Manual or Auto. Fuse The state of the fuse on the Output Module, OK or Blown.
Fill Outputs	Within this field all the current readings for each fill output configured on tank are displayed. Status Current state of the fill output Running, Waiting, Errors. Output State The current state of the output for the fill output, On or Off. Switch Pos The switch position of this fill output,

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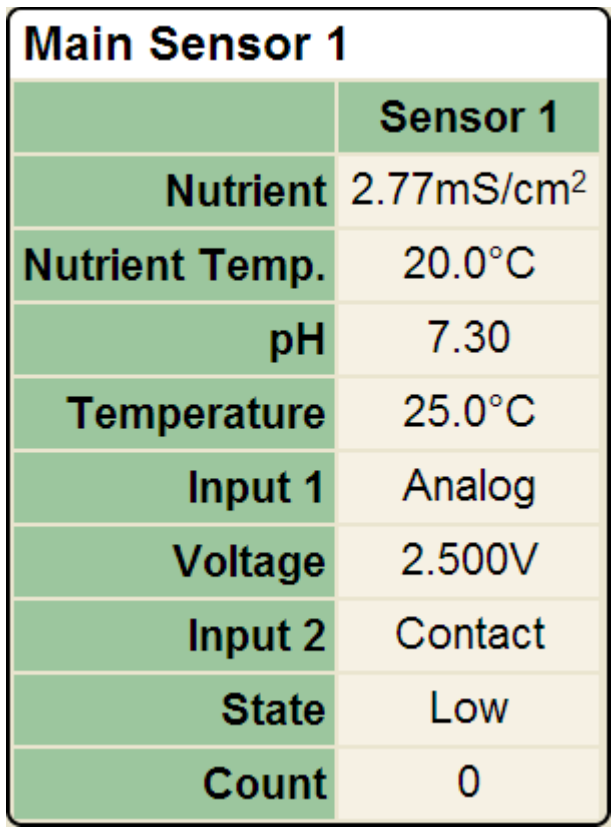
Field	Description
	Manual or Auto. Fuse The state of the fuse on the Output Module, OK or Blown.

EpM Sensor's



The above field displays the readings for every sensor within the Main Sensors 1 group. All the readings from each sensor and each group are the same as pictured above, this includes sensor groups 2 & 3.

Field	Description
Nutrient	The current nutrient reading from the sensor if this is every 0.00mS/cm&sub2 check the probe. A reading this low should not be possible if the probe is in water. A reading of this suggest the probe is no longer submerged in water.
Nutrient Temp.	Current temperature of the water the probe is submerged in. Note due to the nature of the material the probe is made from the thermal conductance of the probe is rather low, this means a change in temperature of the water may take a while to effect the actual temperature displayed here.
pH	Current pH level of the water.
Temperature	The temperature of the Stainless steel External temperature probe wired into the sensor this will appear as XX if not connected or an error has occurred.
Input 1	What the current input wired into the Analog input pin of the sensor is, this will only effect what is displayed in the box below.
Voltage / Moisture / Count	Depending on how Input 1 is configure the variable here will be listed accordingly. *Voltage* Current voltage on the input pin. *Moisture* Current moisture in percentage based on the sensor settings. *Count* Current count of the input pin.
Input 2	What the current input wired into the CC input pin of the sensor is, this will only effect what is displayed in the box below.
Count / Flow	Depending on how Input 2 is configure the variable here will be listed accordingly. *Count* Current count of the input pin. *Flow* Current calculated flow rate based on the frequency being supplied by the input.

Continuous System

Suggested Layouts

Simple gravity fed system

/uploads/irrig-dosing-cont-typical.png

This system is most convenient when the tank is underground. This allows the stock tanks and the acid/alkali tanks to be located at ground level where it is convenient for replenishing and mixing new stock solutions. Where the batch tank is above ground then there are two possibilities. One is to use dosing pumps such as peristaltic pumps and the other is to use small centrifugal pumps to fill “day tanks” once each morning (from a time switch). These pumps may also be used to help with mixing and the use of day tanks can help minimize risk due to a valve, sensor or controller malfunction as these can be sized so that if the total contents was dosed, the plants would survive. If used for mixing the fertilizer, the pumps should be reasonably chemically resistant and capable of handling some solid lumps of fertilizer. Waste water pumps will be often suitable in this application.

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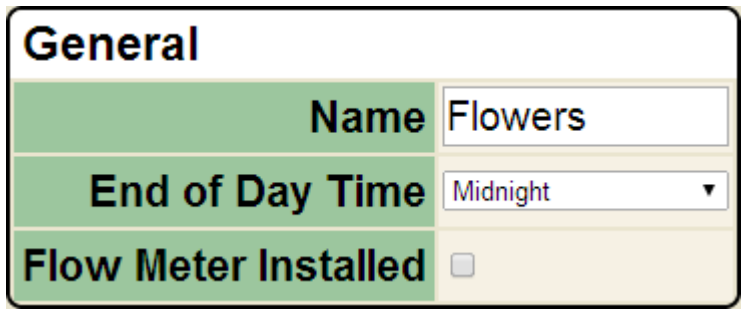
General

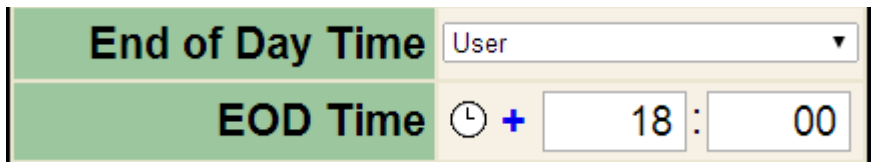
Configuration

Each system has a number of generalized settings which can be found on the top tab settings or configuration page labelled as General, and the status tab on the readings page. These areas are used to display the current general information for the system and any generalized setting or configuration options which are not specific to a particular component within the system.



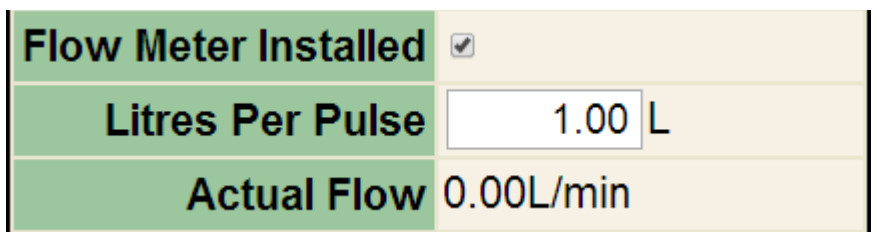
Name: Name for the current system, this is the same setting as found on the summary page.

End of Day Time: An Irrigation system has a few different readings which need to reset daily, this option allows you to select whether these variables are reset at Midnight local time or at a specific time of the day.



EOD Time: If the End of Day Time has been set to User this option will become available. Here a specific time of day can be used to reset specific readings.

Flow meter Installed: If the system has a flow meter installed that is used to measure the irrigation flow this box needs to be ticked.



Litres Per Pulse: This setting box is only displayed once the Flow meter Installed box has been ticked. Here the flow rate of the installed meter must be specified, this value should be specified by the manufacturer of the flow meter.

Actual Flow: This is the current flow rate being measured by the system.

> A Remote EpM sensor must be configured in the system before this reading will display correctly

Time Periods

Time periods for the system can be defined here, up to 5 time periods can be supported by each component within a manager. can be defined as a time of day, offset from sunrise or offset from sunset. The name of the time period is not important for control but very useful when configuring time period dependent variables. Whenever one of these variables is displayed in the system it will appear within a list of all configured time periods so is very important to make the names of each time period something to help identify. Useful names could be the times of day (7am-10am), solar events (Sunrise, Noon), specific time period purposes (Heat trap, RH purge), Times of the day name (Dawn, Morning) or any other useful identifier.

Name: Specify unique name for this time period.

Start Time: Specify the start time for this time period.

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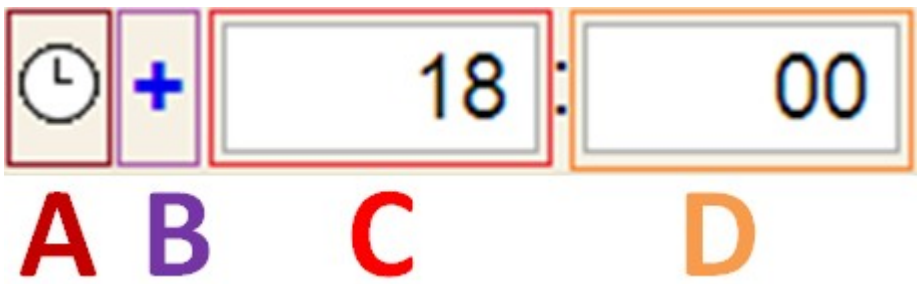
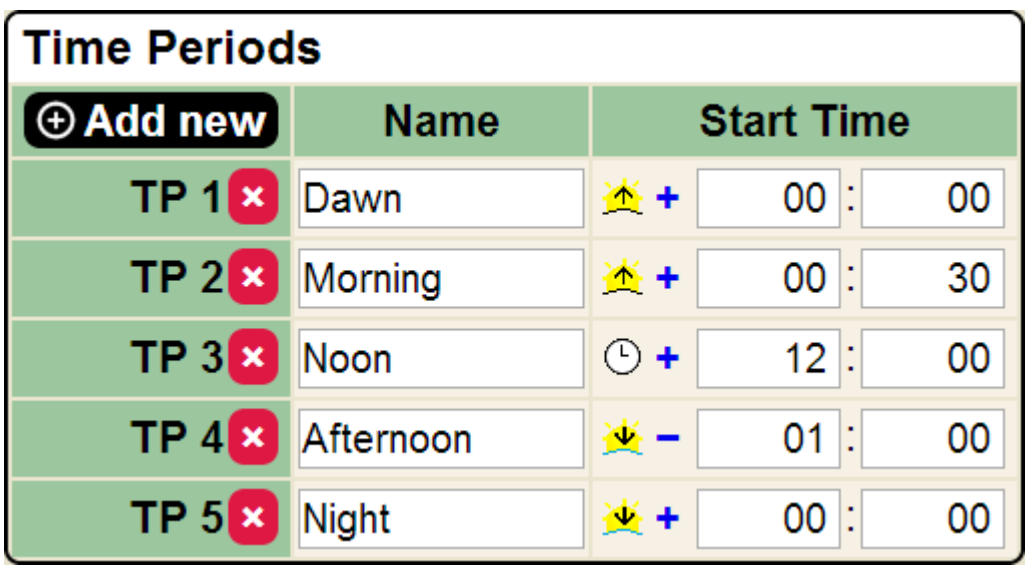
Configuring a Time of Day variable

A time of day variable are used through out the Multigrow system they are variables that will cause a specific event to happen at a specified time.



- **Setting A:** Specifies what the entered time is relevant to.
    - Selecting this icon means that the specified time is an offset from sun rise.
    - Selecting this icon means that the specified time is an offset from sun set.
    - Selecting this icon means that the specified time is a positvie offset from midnight, this is the same format as standard 24 hour time, 07 00 = 7 hour offset from midnight (7am), 19 00 = 19 hour offset from midnight (7pm).
- **Setting B:** States whether the offset being applied is positive or negative to the time specified. Note, when using a normal time this will be positively applied regardless of the setting.
    - The time specified is a positive offset from the first setting.
    - The time specified is a negative offset from the first setting.
- **Setting C:** The offset time hours are specified here.
- **Setting D:** The offset time minutes are specified here.

Using time periods



Each time period is active from the time specified within the box until the time of the next period. In the above configuration you can see a combination of various types of time periods.

If we take Sunrise to be 7:00am and Sunset to be 5:30pm, the time periods for the day work out to be;

Time Period	Name	Start	Stop
1	Dawn	7:00am	7:30am
2	Morning	7:30am	12:00pm
3	Noon	12:00pm	4:30pm
4	Afernoon	4:30pm	5:30pm
5	Night	5:30pm	7:00am

Settings

Time Periods

The first box visible on this page is used to configure the time periods of the system. These settings are identical to the one found on the configuration

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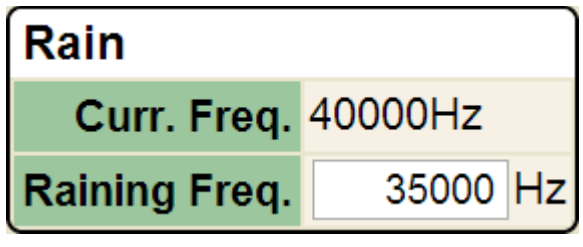
page, please refer the configuration section above for more information on this settings box.

Rain



An irrigation system can use rain to reset certain triggers within a system, here the setting for this can be modified. Note a weather station is used to supply the status of the rain to the system and must be properly configured for this functionality to work correctly.

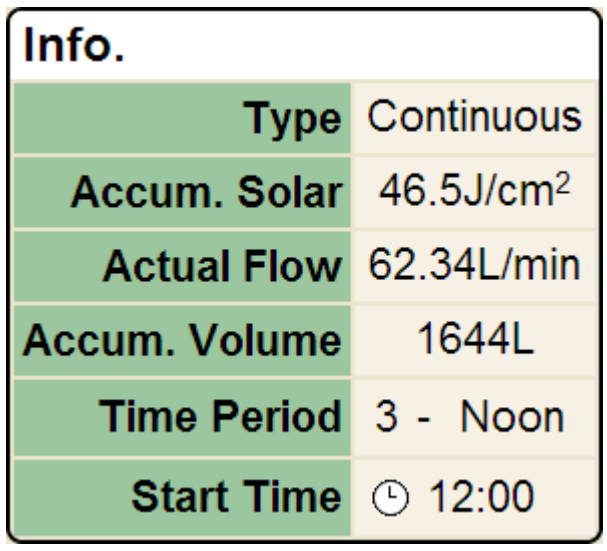
Curr. Freq.: Current frequency being measured by the weather station.

Raining Freq.: Frequency in which this particular irrigation system deems it to be raining.

Readings

The Readings -> Status page for any irrigation system contains a quick snap shot of the systems current state. A small selection of important readings for each installed module will be displayed here.

Info.



Field	Description
Type	Configured type of irrigation system.
Accum. Solar	Accumulated solar from the systems solar sensor, this is reset at the end of day for the system.
Actual Flow	If a flow meter has been install on the system the current flow from the measure EpM sensor group will be displayed here.
Accum. Volume	If a flow meter has been installed the volume of water will be accumulated based on the flow rate systems flow rate, this is reset at the systems end of day.
Time Period	The current active time period on the system, included the number of period and the name given to it.
Start Time	Start time of the current time period.

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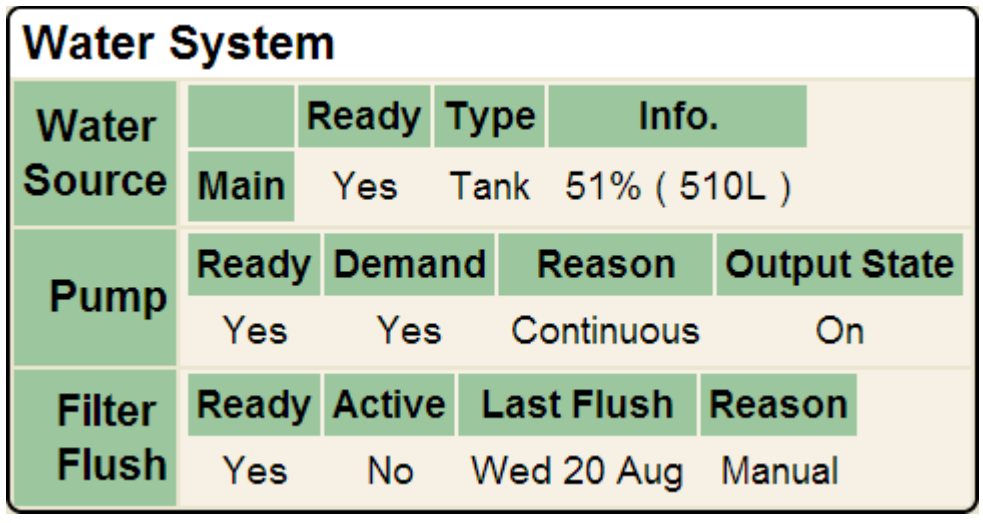
Water System



Depending on what modules have been installed on the system the information in this box will vary.

Water Source

The "Main" label that is shown in the above screen capture is actually the name given to this water source, this will vary depending on what the name of the source is set to. If no name is given this will appear as simple "Source".

Field	Description
Ready	Is the current configured water source ready. Note a town water supply is always ready.
Type	Type of water source configured.
Info.	If a water source has been configured as a Tank or Batch tank system the current fill level will be displayed here in both percentage and litres. Town water source does not have any relative information so is left blank.

Pump

If a pump has been installed on the system relevant information will be displayed here.

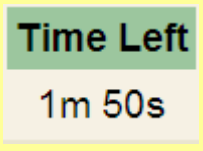
Field	Description
Ready	Is the pump ready to run.
Demand	Is their a demand for the pump to be on, if so the output should be on.
Reason	The reason why the pump is on. Note in a continuous system a main pump is always on unless an installed filter flush is happening. If the pump switch is in manual or the system cannot communicate to the pumps output module this will cause an Output Error on the system.
Output State	Current actually state of the output the pump is physically wired into.

Filter Flush

If a filter flush module has been installed on the system the relevant information will be displayed here.

Field	Description
Ready	Is the filter flush ready, this means a flush is not currently active on the system.
Active	Is the system actively flushing the filter currently.
Last Flush	The date of the last completed flush.
Reason	The reason for the latest filter flush.

If a filter flush is currently active an additional field will appear with the time left until it is completed.



Also if a filter flush is installed and becomes active the main pump for the system will be shut off unless the run pump setting for the flush has been configured.

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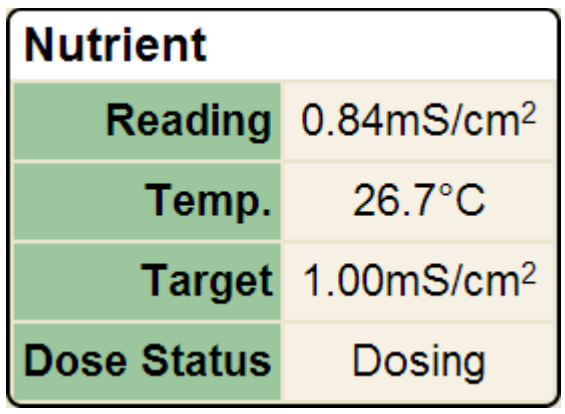
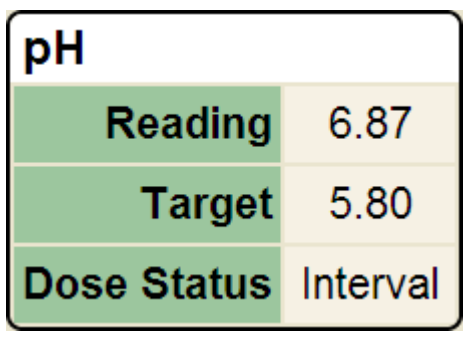
Nutrient



If the system has been configured to use nutrient dosing the current state of this module will be displayed here.

Field	Description
Reading	Current reading the system is using for dosing control, this is provided by the Measure EpM sensor group.
Temp.	Current tempeture of the water the probe is in, this is also provided by the Measure EpM sensor group.
Target	Current target the system is trying to achieve, this is set on the Settings -> Program page.
Dose Status	Current state of the nutrient dosing module.

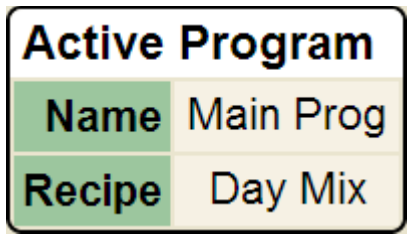
pH



If the system has been configured to use pH dosing the current state of this module will be displayed here.

Field	Description
Reading	Current reading the system is using for dosing control, this is provided by the Measure EpM sensor group.
Target	Current target the system is trying to achieve, this is set on the Settings -> Program page.
Dose Status	Current state of the pH dosing module.

Active Program



On a continuous system the nutrient and pH levels of the day are always trying to be maintain, this means there is always an active program and recipe.

Field	Description
Name	The name of the currently active program, note that on a continuous system there is only one program so this will always be the same.
Recipe	The name of the current active recipe for this time period.

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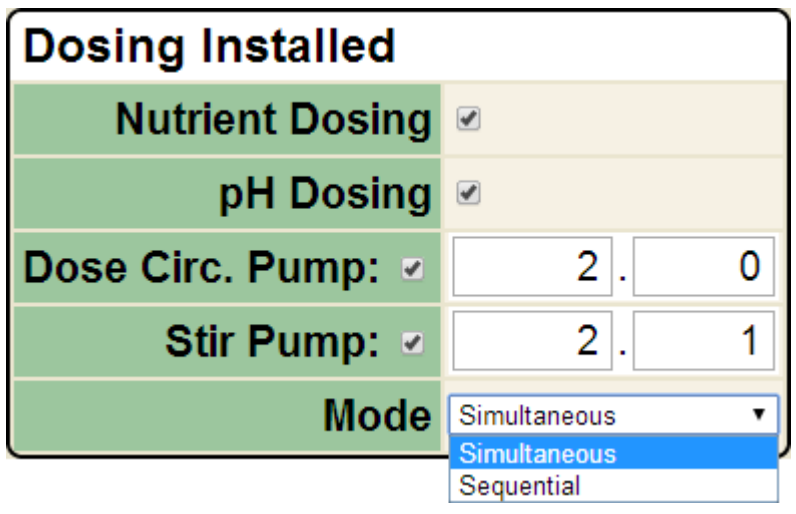
Dosing

Configuration

Install



Nutrient Dosing: This box must be ticked if nutrient dosing is to be used within the batch system.

pH Dosing: This box must be tick if pH correction is to be done on the batch system.

Dose Circ. Pump: Ticking this box will enable the use of a "Circulation Pump" to supply large volumes of nutrient/pH to the dosing valves. This will also enable an output expander address box to be configured.

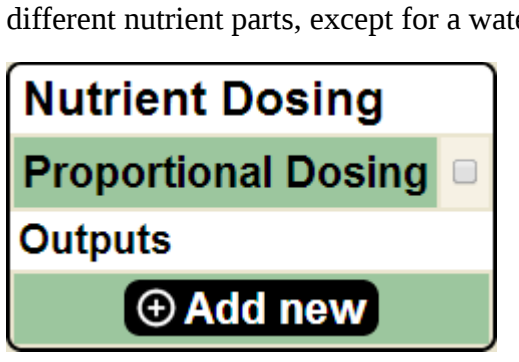
Stir Pump: Ticking this box will enable the use of a Stir Pump within a continuous system. This will also enable an output expander address box to be configured.

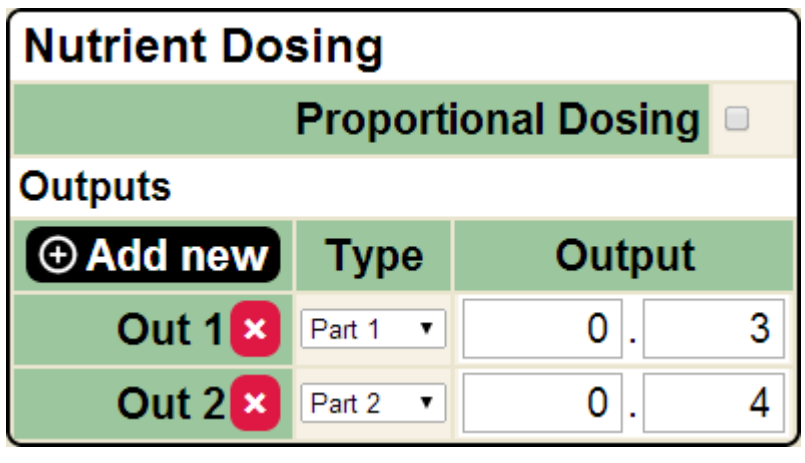
Mode: Controls how the Nutrient and pH dosing valves work together in the system. If all the dosing valves are wired on to the same output expander it is possible for them to all turn on at the same time. This may cause a large inrush of current which the output expander might not be able to handle.

- ***Simultaneous:*** Both the nutrient and pH dosing valves will act independently of each other.
- ***Sequential:*** Nutrient and pH dosing valves cannot operate at the same time.

Nutrient Dosing

If the Nutrient dosing has been installed the option for added nutrient dosing valves will become available. Each irrigation system can support up to 10 different nutrient parts, except for a watering system where no dosing can be installed.





Proportional Dosing: Proportional dosing means that the dose time for nutrient doses will change in relation to how far away from the target the current reading is.

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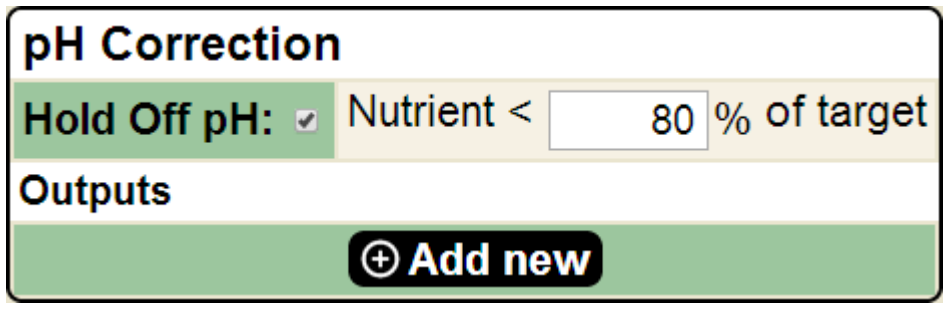
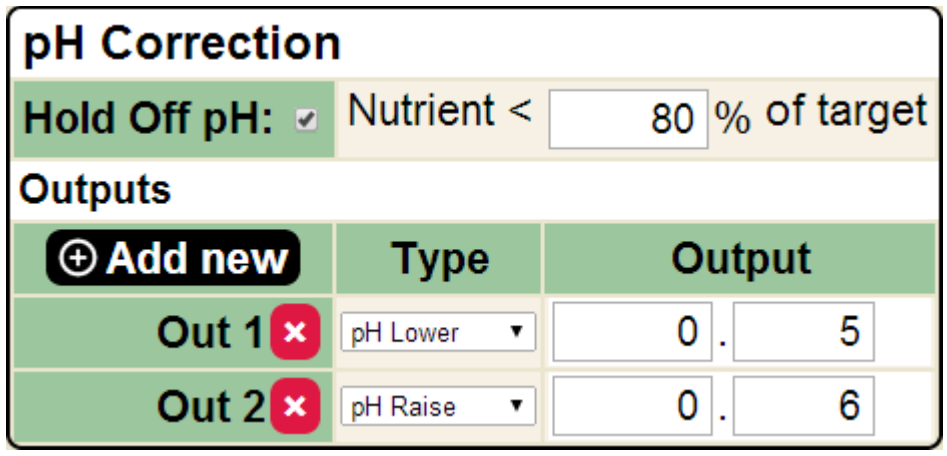
Type: Once a valve is installed the type field can be seen, this is used to specify which Part of the nutrient mix this valve is physically connected to.

Output: Address of the output expander this valve is wired to, see section 3.1 configuring a single output for more information.

pH Correction

If the pH dosing has been installed the option for added dosing valves will become available. Each irrigation system can supports both raise and lower pH correction, except for a watering system where no dosing can be installed.





Hold Off pH: When nutrients are mixed into a tank they can have an effect of the pH of the water. It is recommended to hold off pH dosing until the nutrient level of the tank gets closer to the target at which point the nutrient dosing will ease off.

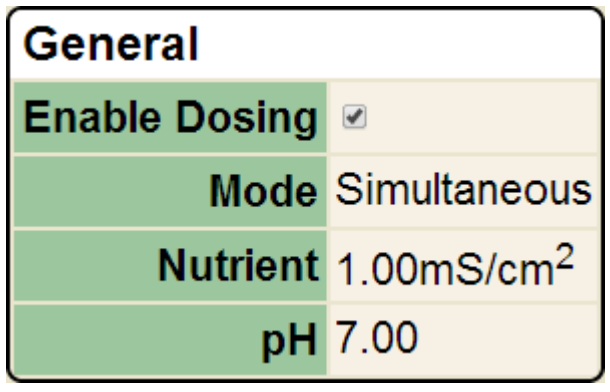
Type: Once a valve is installed the type field can be seen, this is used to specify which type of pH correction raise or lower this valve is physically connected to.

- ***pH Raise:*** When this output is driven Alkali will be dosed into the system raising the pH.
- ***pH Lower:*** When this output is drive Acid will be dosed into the system lower the pH.

Output: Address of the output expander this valve is wired to, see section 3.1 configuring a single output for more information.

Settings

General



Enable Dosing: An overall enable for the dosing system this must be ticked for both pH and Nutrient dosing to occur on the system.

Mode: Current dosing mode of the system.

- *Simultaneous:* Nutrient and pH valves can operate whenever they need to.
- *Sequential:* Nutrient and pH valves can operate at the same time.

Nutrient: Current nutrient reading for the system being provided by the Measure EpM sensor group.

pH: Current pH Reading for the system provided by the Measure EpM sensor group.

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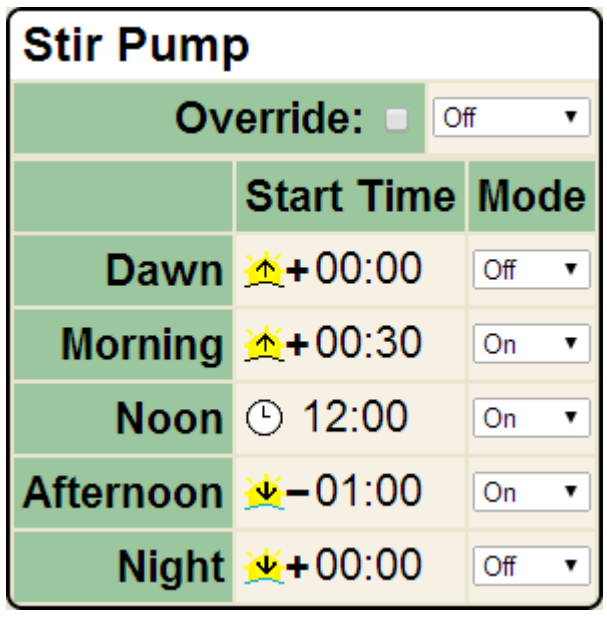
Stir Pump



The still pump has very limited settings the output can either be software overridden and on/off mode specified for each time period. Note that if a stir pump is installed it must be on for dosing to happen within the time period.

Override: Ticking the box will force the output to the state specified in the drop down box.

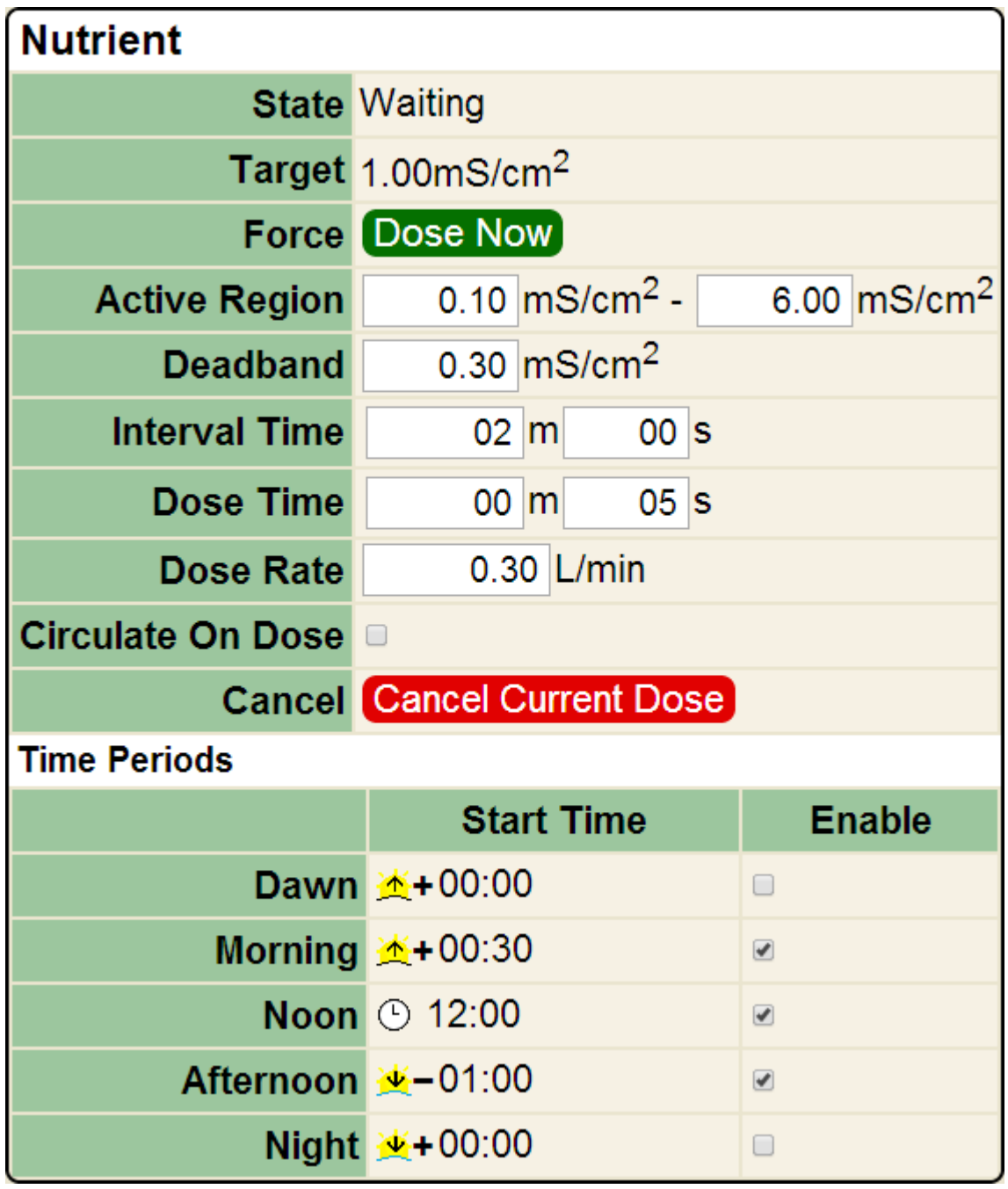
Mode: Whether the stir pump is on or off for a particular time period.

Dose Circulation Pump

A dose circulation pump is controlled by the individual dosing modules within the system and does not have any real setting of its own. The output can only be software overridden.

Override: Ticking the box will force the output to the state specified in the drop down box.

Nutrient



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State: Current state of the nutrient dosing module.

Target: Current target the module is trying to achieve, this is specified in the program and can change per time period.

Force: Pressing the Dose Now button force the nutrient module to turn on the dosing valves for the dose time specified, not that after a forced dose the module will enter the interval state in order to stop a normal dose happening directly after a forced dose.

Active Region: The active region is to try an stop overdosing if an error has occurred. The two settings are the lowest and highest value the nutrient can be and dosing can still happen. If the probe is no longer in water it will return a reading of zero, since the probe is not in the water it will be unable to detect the effects of a dose so it should not be done. A reading on the high should never be possible as the module will stop dosing when the target is reached, however if the probe has become faulty a high reading might occur. It is wise to set the upper region to a value 50% high than the target.

Deadband: Once the target is reached the dosing module will shut off, the level of nutrient must then drop below the target - the dead band in order for dosing to restart.

Interval Time: Once a single dose has occurred the module will enter the interval state. Once here it must wait for the time specified in this field before another dose can occur. The interval time is needed to insure that the the last doses effect has been fully reacted throughout the tank.

Dose Time: The dose time specifies how long the maximum time is a dosing valve will be on for. Using the example above if the current recipe calls for 100% of part A and 50% of part B, Dosing valve A will be on for 5 seconds where as valve B will be on for only 2.5 seconds.

Proportional Dose time

If the nutrient dosing has been configured for proportional dosing additional setting will be available.

Min. Dose Time	00 m 02 s
Max. Dose Time	00 m 10 s
Prop. Band	1.00 mS/cm^2

Min. Dose Time: If a dosing valve is active it must be at least on for 2 seconds if dosing at 100%.

Max. Dose Time: A dosing valve cannot be on for longer the 10 seconds.

Prop. Band: The size of the proportional band the dose time will be scaled across in relation to the target and current reading.

Proportional dosing means the maximum on time for the dosing valves will change proportionally to how close to the target the current nutrient value is. This means that the further away from the target you are the more dosing will happen this allows the module to reach the target a lot faster than set time dosing. The proportional band is set to start from the target - deadband - prop band to the target - deadband.

Proportional Dosing Example:

- **Target:** 1.80mS/cm²
- **Deadband:** 0.30mS/cm²
- **Min. Dose Time:** 0m02s
- **Max. Dose Time:** 0m10s
- **Prop. Band:** 1.00mS/cm²
- *Calculated Proportional Band:* 0.50mS/cm² - 1.50mS/cm²

Current Reading	Calculate Dose Time
0.30mS/cm²	10s
0.50mS/cm²	10s
0.80mS/cm²	8s
1.00mS/cm²	6s
1.20mS/cm²	4s
1.50mS/cm²	2s
1.70mS/cm²	2s

Dose Rate: Volume which is passed through the dosing valves if they are constantly on for a minute. This does not effect any control on the system it is used to calculate the volume of the nutrient the module has used per day.

Circulate On Dose: If this box is tick the circulation dose pump will be driven on when the nutrient dosing module is not in the waiting state. This option is only visible if a circulation pump has been installed on the system.

Cancel: Pressing the Cancel Current Dose will cancel any dose that is currently active on the module. Once cancelled the module will enter the

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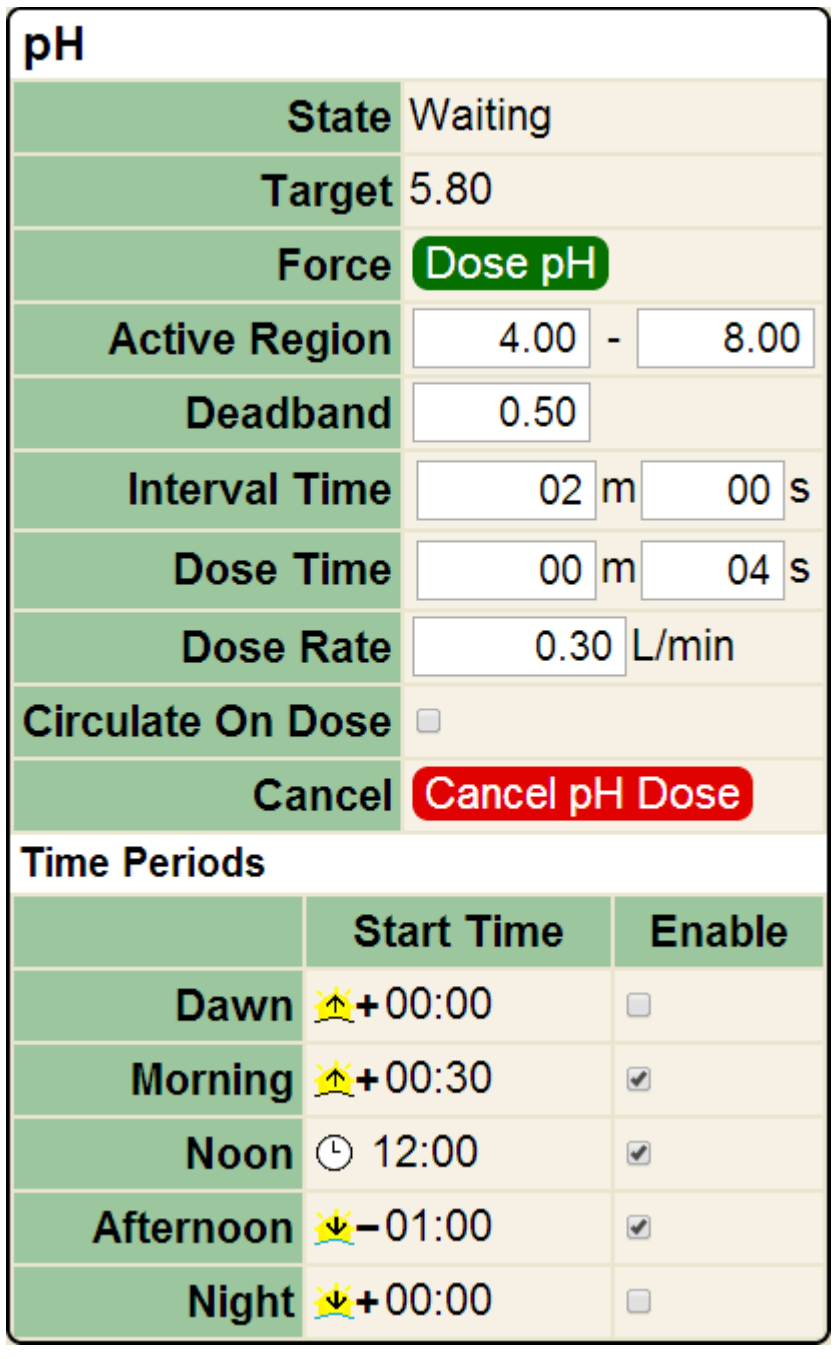
interval state, if the system still required dosing it will start again after the interval state. This button merely cancels the active dose, to stop dosing completely the nutrient settings should be modified to insure dosing is no longer required or enabled.

Enable: Nutrient dosing can be enabled during different time periods to allow greater control of the module.

pH



State: Current state of the pH dosing module.

Target: Current target the module is trying to achieve, this is specified in the program and can change per time period.

Force: Pressing the Dose pH button force the module to turn on the dosing valves for the dose time specified, not that after a forced dose the module will enter the interval state in order to stop a normal dose happening directly after a forced dose.

Active Region: The active region is to try an stop overdosing if an error has occurred. The two settings are the lowest and highest value the pH can be and dosing can still happen. If the probe is no longer in water it will start to drift to either a high or low value this cannot be predicted for a pH probe. Since the probe is not in the water it will be unable to detect the effects of a dose so it should not be done.

Deadband: Once the target is reached the dosing module will shut off, the level of pH must then move outside the target +/- the dead band in order for dosing to restart. The pH deadband having a plus or minus offset is determined by the dosing mode specified in the program.

Interval Time: Once a single dose has occurred the module will enter the interval state. Once here it must wait for the time specified in this field before another dose can occur. The interval time is needed to insure that the the last doses effect has been fully reacted throughout the tank.

Dose Time: The dose time specifies how long the maximum time is a dosing valve will be on for.

Dose Rate: Volume which is passed through the dosing valves if they are constantly on for a minute. This does not effect any control on the system it is used to calculate the volume of the pH module has used per day.

Circulate On Dose: If this box is tick the circulation dose pump will be driven on when the nutrient dosing module is not in the waiting state. This option is only visible if a circulation pump has been installed on the system.

Cancel: Pressing the Cancel Current Dose will cancel any dose that is currently active on the module. Once cancelled the module will enter the interval state, if the system still required dosing it will start again after the interval state. This button merely cancels the active dose, to stop dosing completely the pH settings should be modified to insure dosing is no longer required or enabled.

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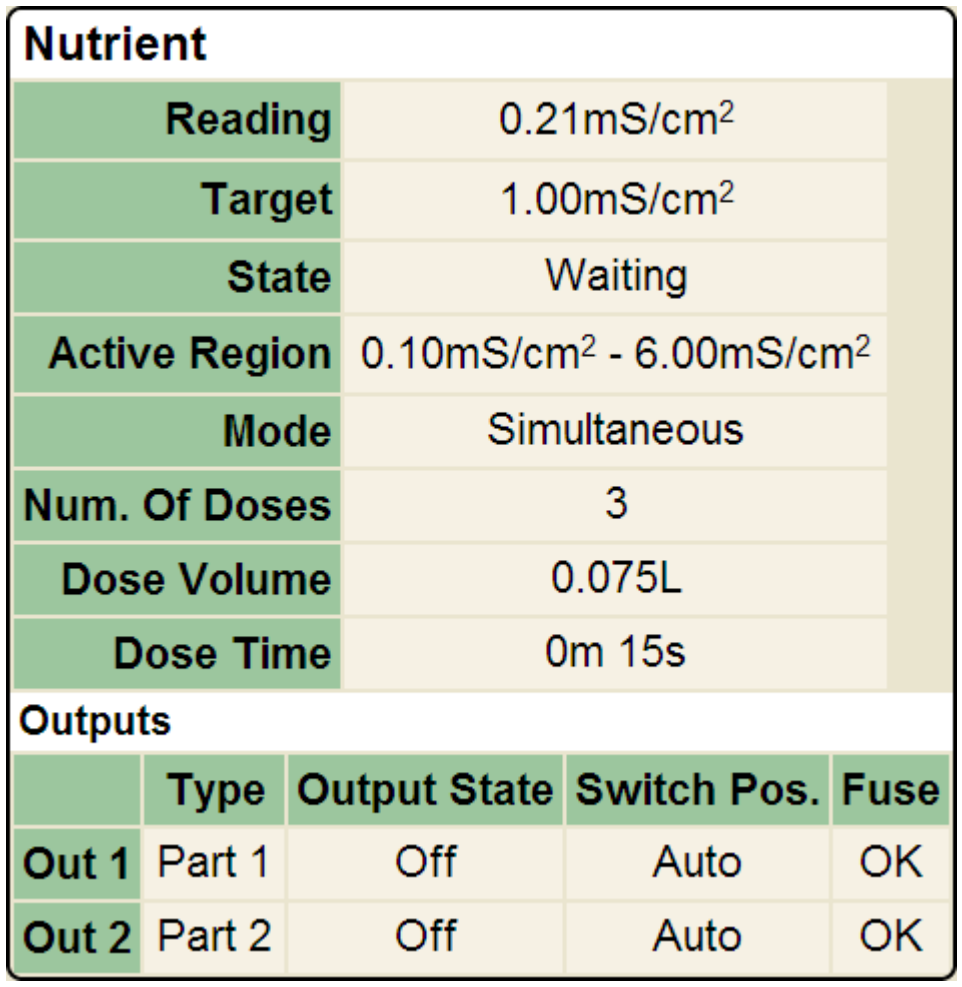
Enable: pH dosing can be enabled during different time periods to allow greater control of the module.

Readings

Nutrient



For this box to be visible nutrient dosing needs to be installed on the current irrigation system.

Field	Description
Reading	Current nutrient reading for the system based on the inputs from the Measure EpM sensor group.
Target	Current nutrient target set by the program, this is what the nutrient dosing module is trying to achieve on the system.
State	Current state of the module.
Active Region	Dosing is only allowed when the nutrient level is within this region this is to stop dosing when the probe is out of water or when the nutrient level is getting too high.
Mode	Current mode of the dosing system as defined on the configuration page, this can be *Simultaneous* or *Sequential*.
Num. Of Doses	Number of doses performed by the module since the last end of day on the system.
Dose Volume	Total volume the doses used today, this is based on the Dose Rate setting for the module.
Dose Time	Total time the pump has been active today, this is based on the Dose Time.
Outputs	
Type	What part this output has been configured to dose.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

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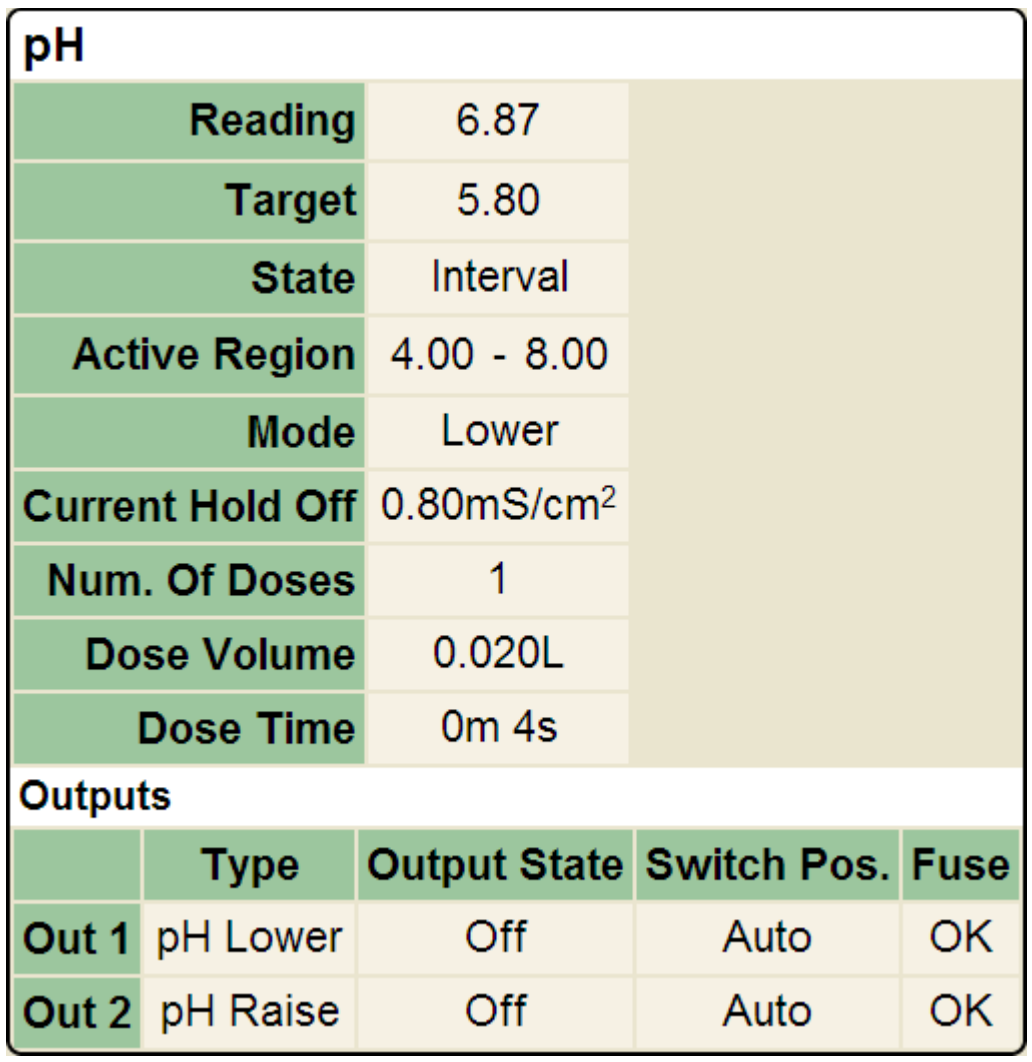
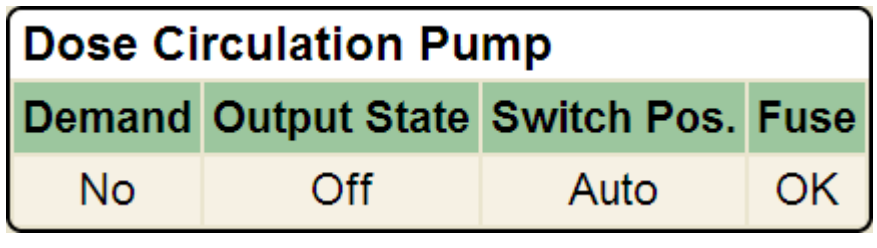
pH



For this box to be visible pH dosing needs to be installed on the current irrigation system.

Field	Description
Reading	Current pH reading for the system based on the inputs from the Measure EpM sensor group.
Target	Current pH target set by the program, this is what the pH dosing module is trying to achieve on the system.
State	Current state of the module.
Active Region	Dosing is only allowed when the pH level is within this region this is to stop dosing when the probe is out of water or when the pH level is getting too high/low.
Mode	Current mode of the pH dosing system as defined by the program, this can be *Lower* or *Raise*.
Current Hold Off	If pH hold off is enabled on the system, the required level the nutrient must be in order for the pH dosing to be allowed.
Num. Of Doses	Number of doses performed by the module since the last end of day on the system.
Dose Volume	Total volume the doses used today, this is based on the Dose Rate setting for the module.
Dose Time	Total time the pump has been active today, this is based on the Dose Time.
Outputs	
Type	What part this output has been configured to dose.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Dose Circulation Pump



If a circulation pump has been installed on the system this box will become visible.

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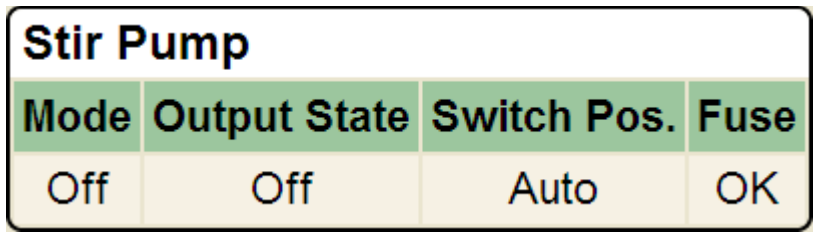
Field	Description
Demand	Is there a current demand from the nutrient of pH dosing modules for the circulation pump to be active.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

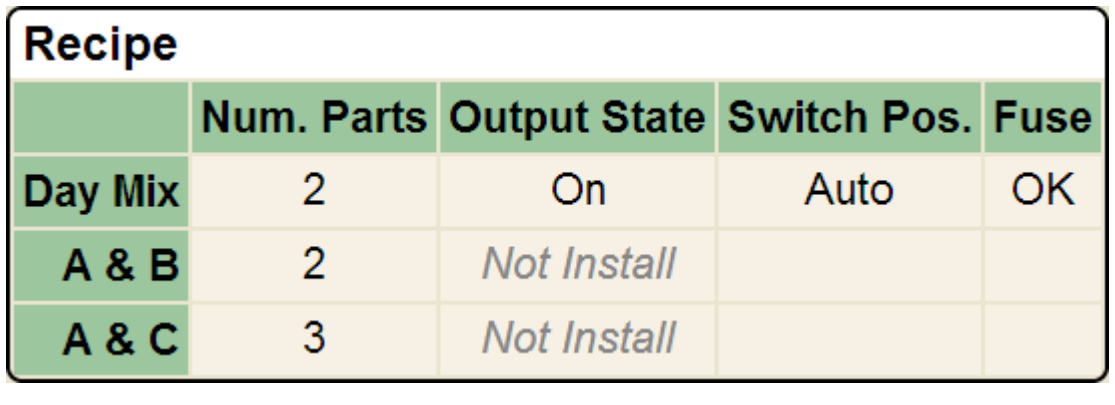
Stir Pump



If a stir pump has been installed on the system this box will become visible.

Field	Description
Mode	This is the current mode set per time period under the dose settings, *On* or *Off*.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

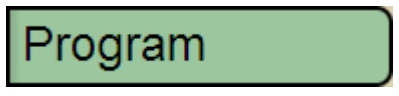
Recipe



This box shows a brief overview of the recipes installed on the system and the number of parts they use, these are configure under the settings section for the system. If a recipe selection output has been configured the state of this output will also be shown here.

Field	Description
Num. Parts	Number of part s configured on the recipe.
Output State	The current state of the output if installed, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Program



A continuous system within the Mutligrow has a single program used to control the dosing.

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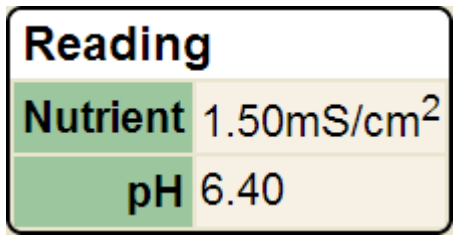
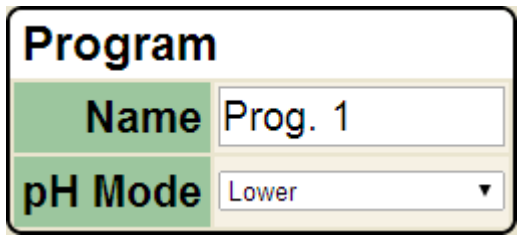
Readings



Nutrient: Current nutrient reading for the system as being reported by the Measure EpM group.

pH: Current pH reading for the system as being reported by the Measure EpM group.

Program

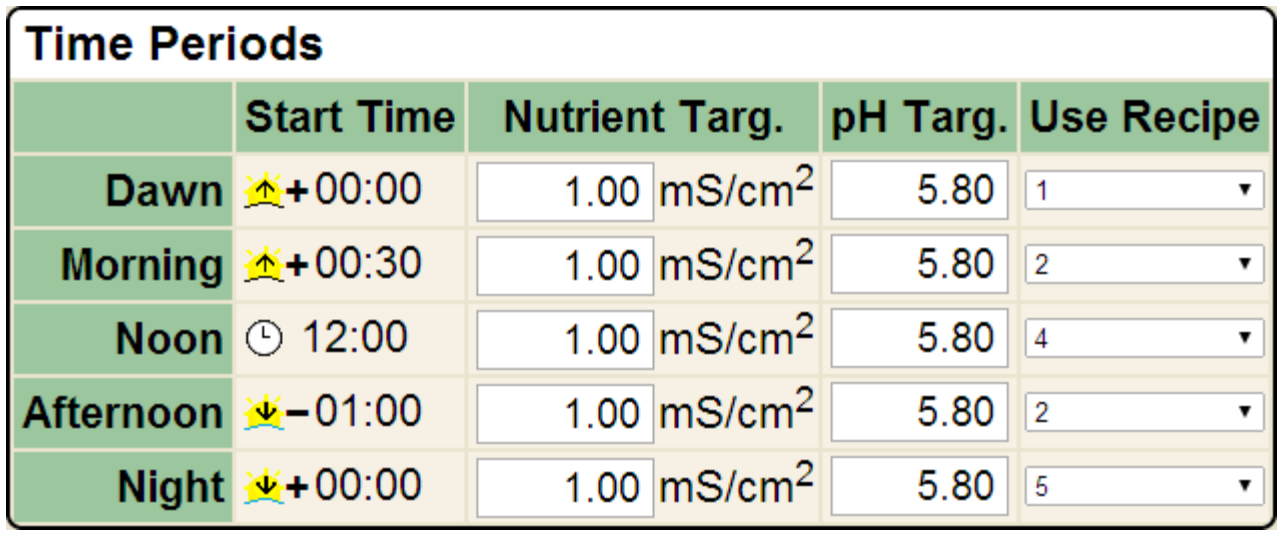


Name: Name given to the program for identification purposes, in a continuous system this is not really important since the program will never change. When a system is irrigating multiple groups with differing programs this name is more useful. If this is left blank it will be displayed as blank elsewhere in the system.

pH Mode: Current mode for the pH dosing module. This will drive all pH dosing valves with type set to this.

- ***Lower:*** The program will try to lower the pH by dosing acid into the tank.
- ***Raise:*** The program will try to raise the pH by dosing alkali into the tank.

Time Periods


Time Periods
Start Time
Nutrient Targ.
pH Targ.
Use Recipe
Dawn +00:00 1.00 mS/cm2 5.80 1
Morning +00:30 1.00 mS/cm2 5.80 2
Noon 12:00 1.00 mS/cm2 5.80 4
Afternoon -01:00 1.00 mS/cm2 5.80 2
Night +00:00 1.00 mS/cm2 5.80 5

A program can set varying targets and varying recipes per time period to allow different amounts of nutrient or different types throughout the day.

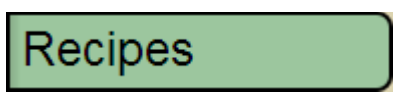
Start Time: Current start time of the time period.

Nutrient Targ.: The nutrient level the system will try to maintain during this time period.

pH Targ.: The pH level the system will try and maintain during this time period.

Use Recipe: Which one of the 10 possible nutrient recipes should the system use during this time period.

Recipes



Every dosing system on the Multigrow has the ablitily to support up to 10 recipes. A recipe specifies exactly how the nutrient parts are to be dosed into the system.

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By default every system should have at least one recipe however if this is accidentally deleted pressing the Add New button will add a new recipe to the system.

Recipes

Add new	Name	Output	Override	Num. Parts	Parts		
						Part 1	Part 2
Recipe 1	Day Mix	0 . 9	Off	2	Ratio	100 %	100 %

Name: Unique name given to this particular recipe if you are using multiple recipes it is wise to make this name something descriptive. This name is used for identification of the active recipe elsewhere in the system.

Output: It is possible to assign a valve to a particular recipe, these are sometime known as recipe select valves. They can be used to make recipes use different stocks tanks to each other. Whenever this recipe is active on the system this output will be turned on.

Override: If an recipe selection valve is installed it is possible to override the output in the software. Ticking the box in this field will force the output to the state specified within the drop down box.

Num. Parts: This specifies the number of parts in the recipe, this needs match highest numbered part the recipe is to use as defined on the dosing configuration page.

Parts: Specifies the ratios of each dosing valve for this particular recipe.

Configuration of Recipe Parts

Though a recipe maybe not contain certain parts the number of parts need to match the installed number of nutrient valves in order to function correctly. If the recipe uses parts that high than bla

Nutrient Valves

Add new	Type	Output
Out 1	Part 1	8 . 2
Out 2	Part 2	8 . 3
Out 3	Part 3	8 . 7
Out 4	Part 4	8 . 8

If a system has four separate parts installed like above it is possible to set up a recipe to only have two parts but it will only be able to use the first two valves. Since the list of parts in a recipe is numerically generated any part that is not included in the list is simply dosed at a rate of 0%.

Recipes

Add new	Name	Output	Override	Num. Parts	Parts				
						Part 1	Part 2	Part 3	Part 4
Recipe 1	A & B	0 . 9	Off	2	Ratio	100 %	100 %		
Recipe 2	B & C			3	Ratio	0 %	100 %	50 %	
Recipe 3	A & D			4	Ratio	100 %	0 %	0 %	75 %
Recipe 4	D Only			4	Ratio	0 %	0 %	0 %	100 %

- *Recipe 1*
  A & B only has two parts configured Part 1 (A) and Part 2 (B) these are set to dose at 100% of the dose time when active. Since this recipe only has two part and they are the first two it is possible to only assign this recipes Num. Parts variable to 2. Dosing valves Part 1 & 2 will run for the full length of the dose time when using this recipe.
- *Recipe 2*
  B & C uses parts 2 & 3 so in order to properly configure this the number of Parts needs to be set to 3 even though only 2 parts are technically

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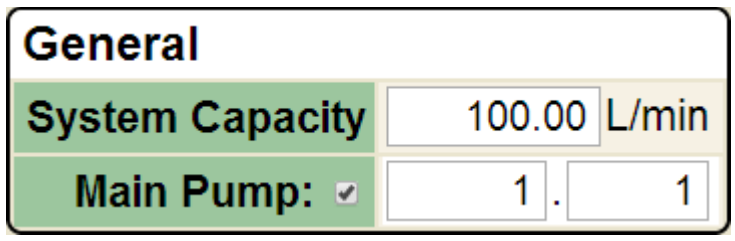
being used, though part 1 is not used the system still need to know what to do with it. Part 1's ratio is set to 0% meaning it will not actually be used when this recipe becomes active. In this recipe Part 2 will dose for 100% of the dose time whereas Part 3 will only dose 50% of this.

- *Recipe 3*
  A & D since this recipe uses part 4 so the Num. Parts setting needs to be set accordingly. Here the system will run dose valve Part 1 for 100% of the dose time, Part 2 & 3 for 0% of the time and Part 4 for 75% of the time.
- *Recipe 4*
  D Only just dose Part 4 for the full dose time when active, however since this is the highest Part in the system the Num. Parts setting still needs to be set to 4. Parts 1,2 & 3 all have ratio of 0% meaning though they are technically part of the recipe they will not actually dose when this recipe is active.

Water System

Configuration

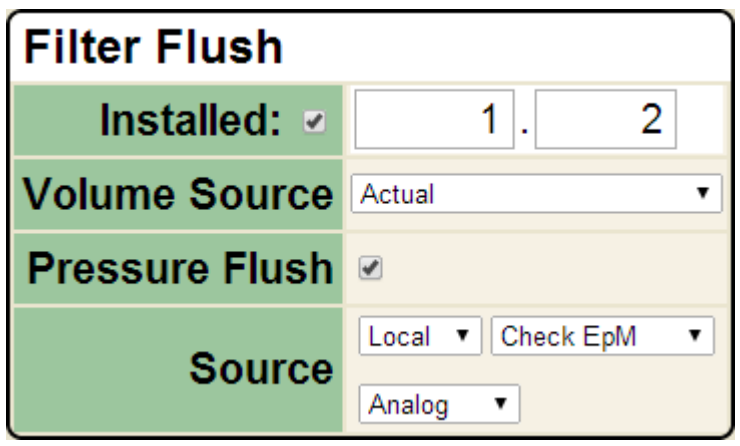
General



System Capacity: This setting is important for irrigation systems. It specifies the water throughput capability of the system, this is used to determine if multiple stations or multiple groups can run. It can also be used in certain aspects of dosing.

Main Pump: Ticking the main pump box will display the output assignment box for the pump. A main pump is the pump used for irrigation of the zones, in some cases this can also be used to stir the batch tank.

Filter Flush



Installed: If the irrigation system has a filter installed it is usually recommended to flush this periodically. Ticking this box will enable an output to be assigned to the filter flush. When flushing this output will becoming active.

Volume Source: It is possible to select the filter flush on volume to look at either the actual or calculate volumes used on the system.

- ***Calculated:*** The filter flush will use the calculated volume reading in order to trigger a filter flush. Note that the calculated volume is derived from the flow rate set under each station with in a system, these values must be correctly enter for accurate results.
- ***Actual:*** The filter flush will use the actual volume reading to trigger. Note that this value is derived using the actual flow supplied by the Measured EpM sensors. A flow meter must be properly configured on the system in order to use this volume correctly.

Pressure Flush: A filter flush can be triggerd from a pressure sensor. A pressure sensor is used to detect when the filter has become to blocked and needs to be flushed.

Source: The input where the pressure sensor is physically wired in to. This can be Main or Local EpM sensors CC or Analog (Moist) input.

Flow Triggered Output

A flow triggered output is a general purpose output that can be configured to turn on when flow is detected from any number of sensor sources. Flow levels can be adjusted to make sure the output will only turn on when a certain amount of flow has been detected.

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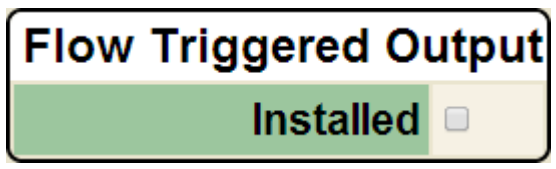
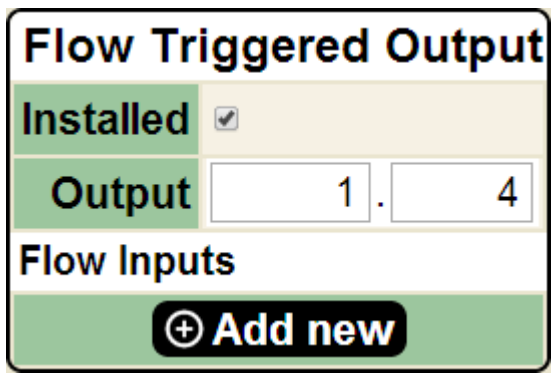


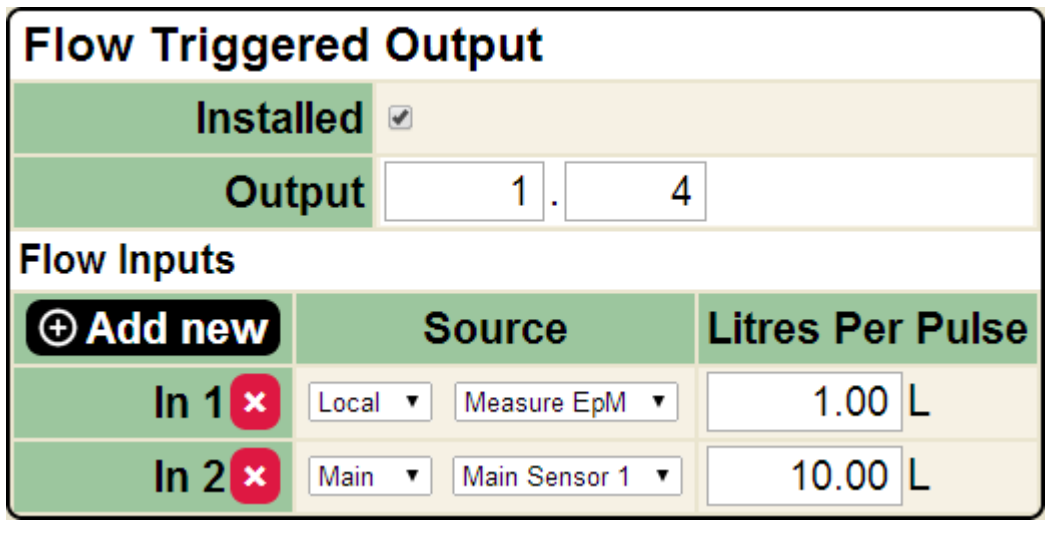
Installed: Ticking this box will install a flow triggered output onto the irrigation system. Once ticked the output configuration options will be displayed.



Output: Address of output that will be driven on when flow is detected.

Flow Inputs

Any number of flow inputs can be added to the system. Once added each one needs to be configured.

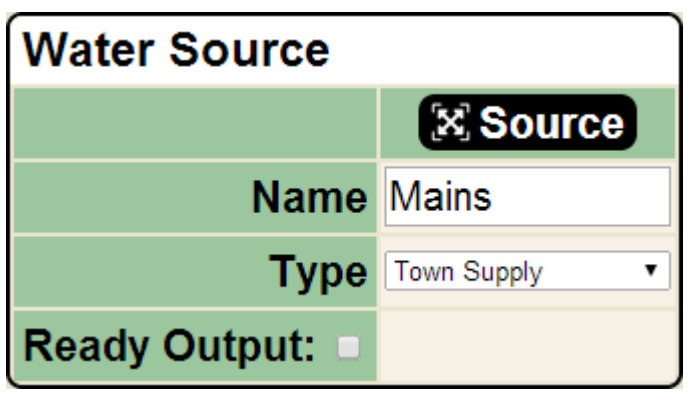


Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
  - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
  - ***Check:*** Flow source is the Check Remote EpM sensor group.
  - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
  - ***Main Sensor 1:*** Flow source is from Main Sensor 1.
  - ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: Here the flow rate of the desired source is specified, this value should be specified by the manufacturer of the flow meter.

Water Source



Name: This is a unique name given to the water source useful for identification elsewhere in the system. It is also used for alerting.

Type: Type of water source being used on the system. This can vary depending on individual requirements of the system.

- ***Mains:*** Irrigation system is connected directly to a main water supply.

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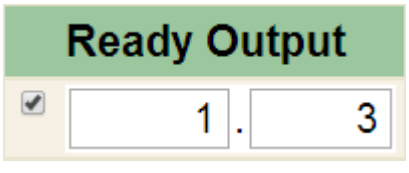
- ***Tank:*** The irrigation system is feed from a tank. Note this is not the same as a batch tank. If the batch tanks fill input is on the output of another tank then this option should be selected.
- ***Blend Tank:*** This is the same as a normal tank except with the added ability for blending two different fill inputs in order to try and pre-blend the nutrient level of the tank.
- ***Main Tank 1, 2 & 3:*** Main Tanks are identical to normal system tanks but are configured at the site level. This is useful if one tank is to be used across multiple irrigation systems. These are configured outside of an irrigation system, since they are used across multiple systems.

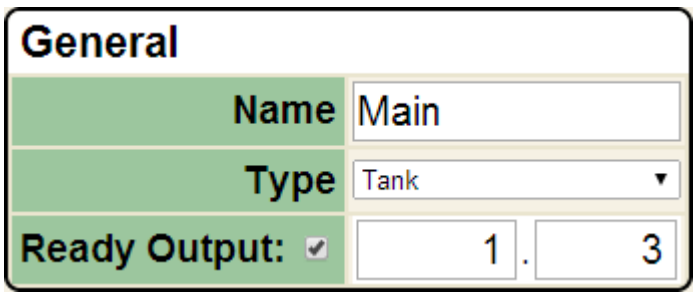
Ready Output: A water source such as a tank may only be ready when it is a certain percentage full, if a ready output is installed this will turn on once the water system has determined it is ready. Note a Town Water source is always ready.



Additional Configuration

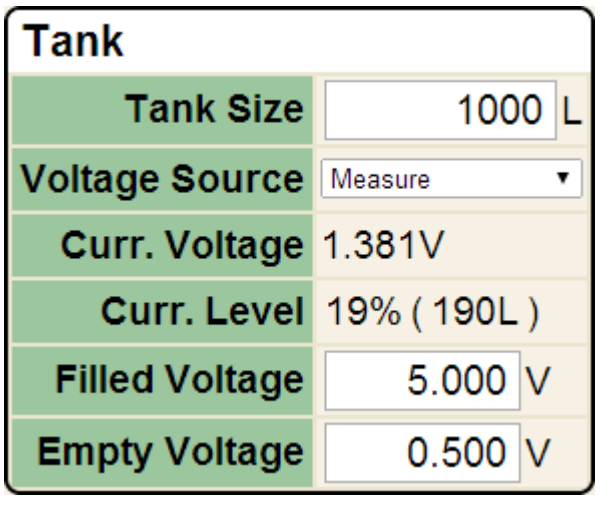
Pressing the source button at the top of the box will display additional configuration's for the water source depending on which type of source has been selected.

General



The general box displays the same settings as the overview box for the water source. See above for more information of these settings.

Tank



IF the water source is a Tank or a blending tank this box will be displayed here all the information for configuring a tank will be displayed.

Tank Size: Size of the tank being used for batching, this is not crucial to the control of the tank as the voltage readings determine the actual tank level. This is more for user feed back of the tanks exact level.

Voltage Source: The Remote EpM group the tank level sensor is being reported to.

- ***Measure:*** The tank level sensor is connect to a Remote EpM under the Measure Group.
- ***Check:*** The tank level sensor is connect to a Remote EpM under the Check Group.
- ***Source:*** The tank level sensor is connect to a Remote EpM under the Source Group.

Curr. Voltage: Current voltage on the Moist input of the sensor source selected above.

Curr. Level: Current level calculated from the settings.

Filled Voltage: When the tank is full enter the value being displayed under Curr. Voltage into this field.

Empty Voltage: When the tank is empty enter the value being displayed under Curr. Voltage into this field.

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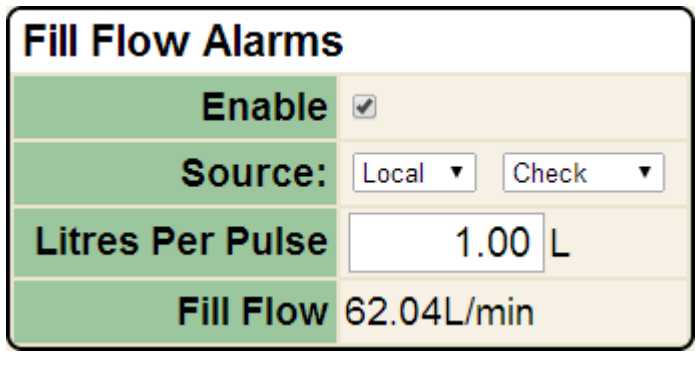
Fill Flow Alarms



IF the water source is a Tank this box will be displayed.

Enable: This box will enable the fill flow alarm on the system. Once ticked and saved additional options will become available.

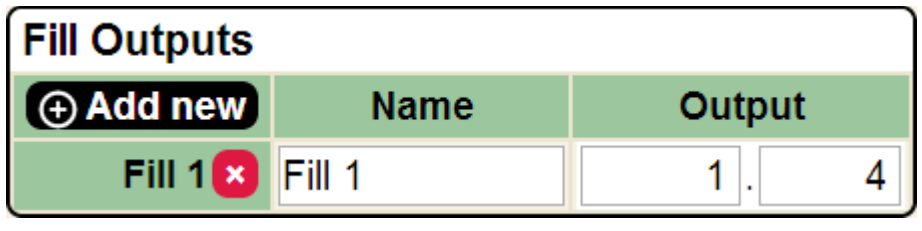
Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
  - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
  - ***Check:*** Flow source is the Check Remote EpM sensor group.
  - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
  - ***Main Sensor 1:*** Flow source is from Main Sensor 1.
  - ***Main Sensor 2:*** Flow source is from Main Sensor 2.
  - ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: How many litres is passed through the flow meter before a single pulse is generated, this is specified by the manufacture of the meter.

Fill Flow: Current flow being measured by the configured sensor source.

Fill Outputs

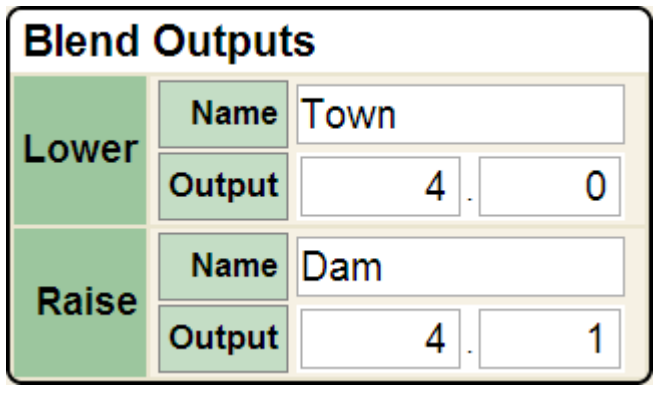


IF the water source is a Tank this box will be displayed. Fill outputs can be added for removed from the tank, a tank can support up to 4 fill outputs.

Name: Name given to the output for identification purposes.

Output: Address of the output the fill valve is physically wired to.

Blend Outputs



IF the water source is configured as a blending tank this box will be displayed.

Lower

The lower output is used to supply water that will effectively lower the nutrient level of the tank, this is usually connected to town water.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

Raise

The raise output is used to supply water that will effectively raise the nutrient level of the tank, this is can be connected to a pre-dosed water supply or

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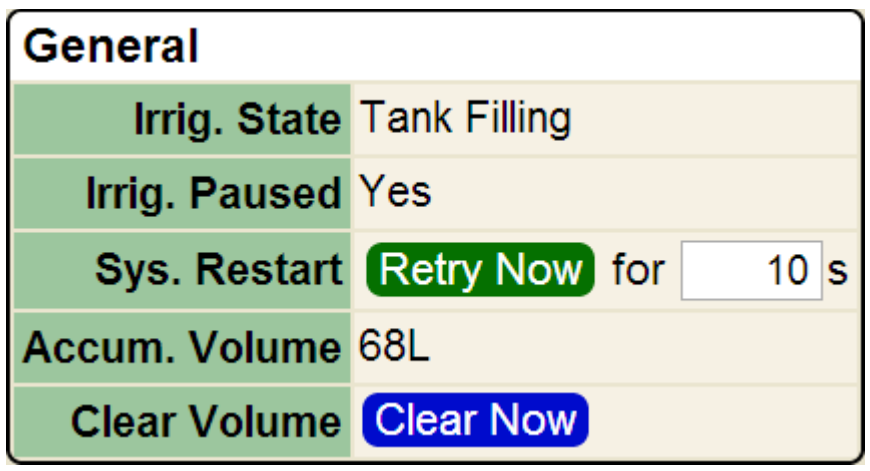
a Dam the collects run off.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

Settings

General

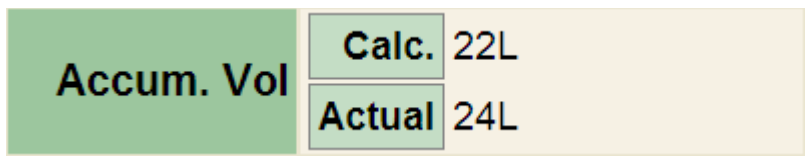


Irrig. State: Current state of the irrigation system. This can be driven from multiple installed functions

Irrig. Paused: Is the irrigation system currently in a paused state.

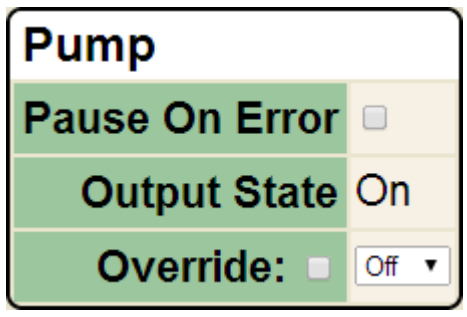
Sys. Restart: If the system is currently paused this box will be displayed, if the irrigation system is in a state in which it might need to be resumed to try and clear this. If a flow error or pump error has occurred the system needs to start running again in order to check if the error conditions have been resolved. Pressing the retry now button will unpause the system and hold it unpaused for the time specified in the box. After this time if an error conditions still exist on the system it will return to the paused state.

Accum. Volume: Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.



Clear Volume: This will immediatelty set the Accumulated volume reading back to zero. This will happen to both the calculated and actual volumes on the system.

Pump



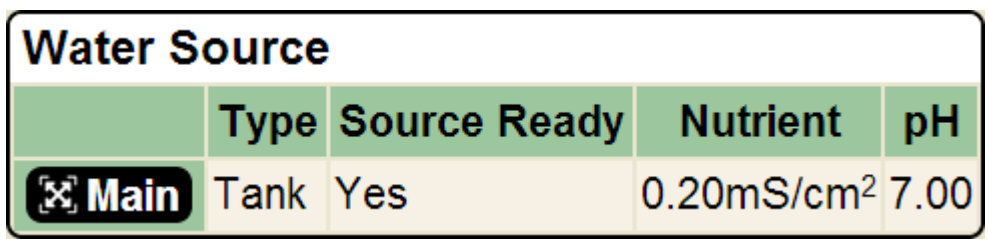
This box will be displayed only if a Main pump has been installed on the configuration page.

Pause On Error: If communications to the output module that controls the pump or the pump switch has been set to manual on this module, an error will be generated by the system. Ticking this box means that when an error like this occurs the system will be paused and stop all irrigation.

Output State: Current state of the pump output.

Override: Ticking this box will override the output to the state specified in the drop down box.

Water Source



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Depending on the type of water source configured on the system the additional options displayed on the expanded menu will differ. The common readings are displayed here, pressing the expand button will bring up extra settings boxes.

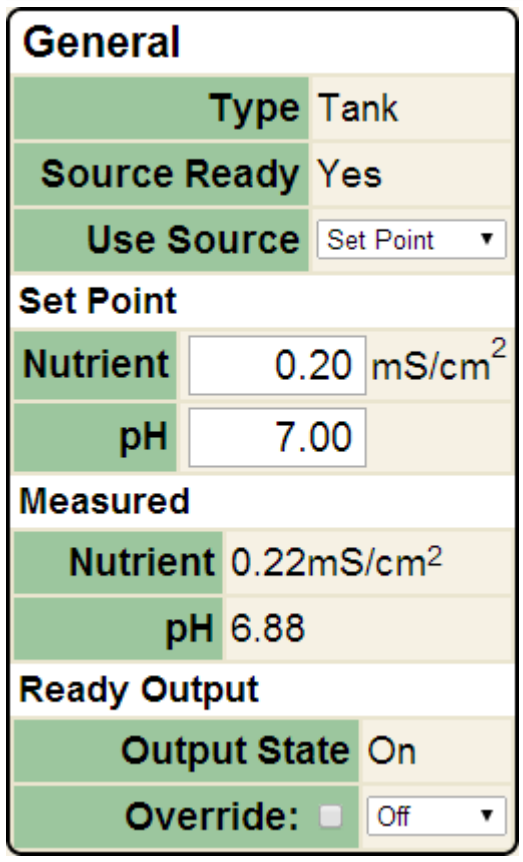
Type: Current type of water source configured.

Ready: Is the water source ready. Note Town Water sources are always ready.

Nutrient: Current nutrient level of the water source.

pH: Current pH level of the water source.

General



The general tab the same for all types of water sources, it is the only options box available for a Town Water and Main Tank source.

Type: Type of water source.

Source Ready: Is the water source currently ready this can be set from a number of places depending on the type configured. For a Tank and Blending tank the locate ready when above is responsible for that, also the failsafe setting. When using main tanks the same settings will drive this value but are based on the main tank ones. A town water source is always ready.

Use Source: Certain dosing alogrithms in the system required a starting point in order to operate correctly. This starting point is the water nutrinet and pH levels. These can be be either from a set point or measured using a Source EpM sensor group.

Set Points

Here both a nutrient and pH source set point can be configured.

Measured

The current nutrient and pH levels being measured from the Source EpM group are displayed here.

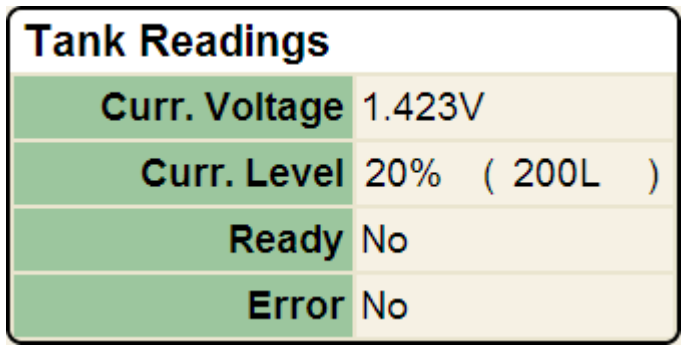
Ready Output

The ready output sub box will only be displayed if a ready output has been configured on the water source.

Output State: Current output state of the ready output.

Override: Ticking this box will override the ready output to the state specified in the drop down box.

Tank Readings



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If a water source is configured as a tank or blending tank this reading box will be displayed, it contains the major readings relating to the tank.

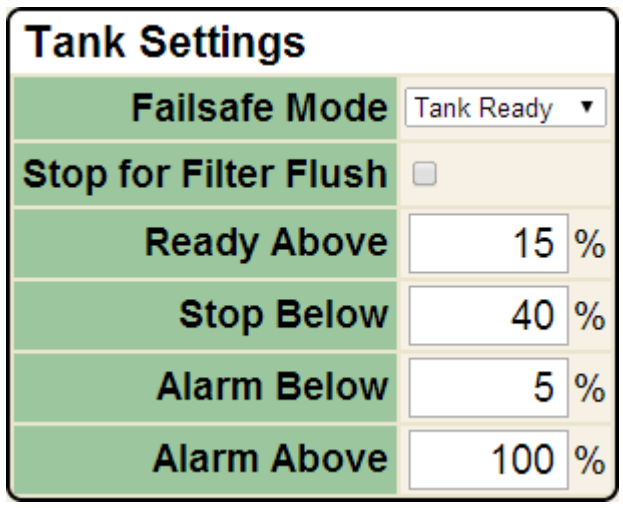
Curr. Voltage: Voltage being reported on the Moist input of the sensor selected to be the source for this tank.

Curr. Level: Based on the size and voltage levels configured for this tank the Curr. Voltage level is converted into a percentage full value as well as a approximate litre value.

Ready: is the tank ready.

Error: Is the an error on the tank.

Tank Settings



If a water source is configured as a tank or blending tank this settings box will be displayed, it contains the major settings for a tank.

Failsafe Mode: If the voltage reading is ever lost the system has no idea what level the tank is at, if a water source is not ready the system will not be above to irrigate. Setting this to Ready means that if the voltage level from the sensor is ever lost the tank will instantly become ready, meaning that irrigation can still happen insuring plants can still be watered. If this is set to Delay the system will become paused as the water source will no longer be ready for irrigation's.

Stop for Filter Flush: If a filter flush functionality has been configured on the system it maybe be necessary to stop the tank from filling during this operation. If this box is ticked and a filter flush is started the tank will stop filling operations.

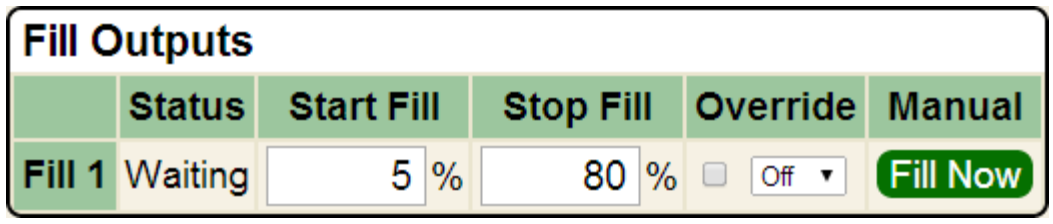
Ready Above: Once the tank has calculated it is at least this full the water source will become ready an irrigation's are allowed.

Stop Below: If the tank ever drops below this level the water source will become unavailable and irrigation's will not be allowed. The different ready and stop levels are used because the tank might usually fill a lot faster than it is irrigated out. This means a tank can be ready sooner and only stop if it drop below a critical level.

Alarm Below: If the tank ever drops below this percentage full an alarm event will be generated by the system.

Alarm Above: If the tank ever goes above this percentage full an alarm event will be generated by the system. If a tank is configured correctly a percentage over 100% should not be possibly if it does the tank configuration might need to be adjusted to insure the reported voltage is converted into a true representation of the fill level.

Fill Outputs



If a water source is configured as a tank type it displayed this setting box.

Status: Current status of the fill output.

Start Fill: When the tank level drops below this value the fill output will be turned on.

Stop Fill: Once the tank level is above this value the output will be turned off.

Override: Ticking the box will force the output to the state specified in the drop down box.

Manual: When a fill output is in the waiting state it can be manual triggered for filling by Pressing the fill now button, this will turn on the output until the tank level reaches the stop fill level or the Stop Now button is pressed. If the fill output is currently running the stop now button will be displayed. Pressing this button will cause the fill output to turn off until the tank level drops below the start fill level or the Fill Now button is pressed. If an error has occurred in which it is not possible to manual run the output this button will be disabled.

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Manual	Manual
Stop Now	Fill Now

Fill Flow Alarm

Fill Outputs

	Status	Start Fill	Stop Fill	Override	Manual
Fill 1	Waiting	5 %	80 %	Off	Fill Now

If a water source is configured as a tank type it displayed this setting box.

Fill Flow: Current flow rate being measured on the fill flow sensor configured.

Alarm if: If the tank is currently filling e.i. any fill output is currently on and the flow being measured on the meter drops below the set level for the specified amount of time and alarm conditions has occurred.

Stop Fill on Alarm: Ticking this box means that if the above alarm conditions are meeting all fill outputs will be stop until this is cleared.

Alarm State: Current state of the alarm.

Stop Output: Has the alarm caused the fill outputs to stop. If this is true the fill outputs state will also change to indicated this.

Alarm State	Alarm Stopped
Stop Outputs?	Yes
Clear Stop	Clear Now

Clear Stop: Pressing the clear now will remove the stop conditions placed on the fill outputs by the alarm. The tank will return to normal operation. This button will only appear if an alarm condition has occurred which stopped the outputs from operating. When the alarm conditions arises the fill outputs status will change to indicated this and the manual buttons will be disabled.

Status
Stopped (Alarm)

Blending Control

Blending Control

Mode	Filling
Blend Above	50 %
Desired Nutrient	1.50 mS/cm^2
Deadband	0.50 mS/cm^2

The blending control box will only be displayed if a water source has been configured as a blending tank. The main blending control of the tank is done by the use of a desired nutrient level setting as well as a deadband. The tank also has a blend above setting which is the level the tank must get to before lower and raise outputs can start to be turned off. Below this level the tank is in fill mode where both output will be on in order to fill the tank as fast as possible. Once a tank has reached it blend level it will use the current nutrient level in order to control the outputs. If the current nutrient level drops below the desired level the raise output will be switched on, if the nutrient level reaches a point which is equal to the desired level plus the deadband the raise output will switch off. If the nutrient level is above the desired level the lower output will be switched on, if the level equal the desired level minus the deadband this output will be switched off. This control method means that both output are usually constantly on and will only switch off if extremes are meet. This is because not only are we trying to maintain a desired level of nutrient with in the tank, we are also try to fill it.

Mode: Current mode of the blending tank. If the tank is currently filling both the lower and raise fill output are on this is to give an even mix of both as well as fill the tank as fast as possible. Blending of the two sources only happens when the tank is sufficiently full.

Blend Above: When the tank level has reach a certain level blend of the water sources can occur.

Desired Nutrient: Desired nutrient level of the water source. This is the main setting that controls the lower and raise outputs.

Deadband: The amount the nutrient level must change by before a change in the fill outputs will occur.

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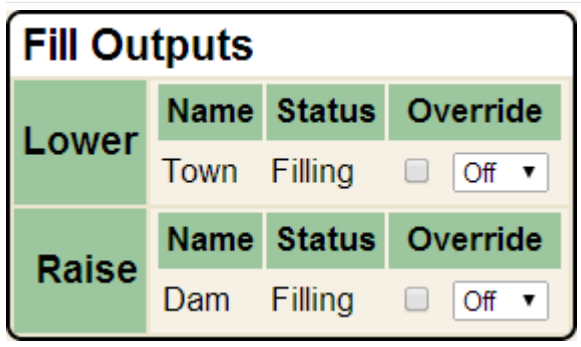
Fill Outputs



The blending control box will only be displayed if a water source has been configured as a blending tank.

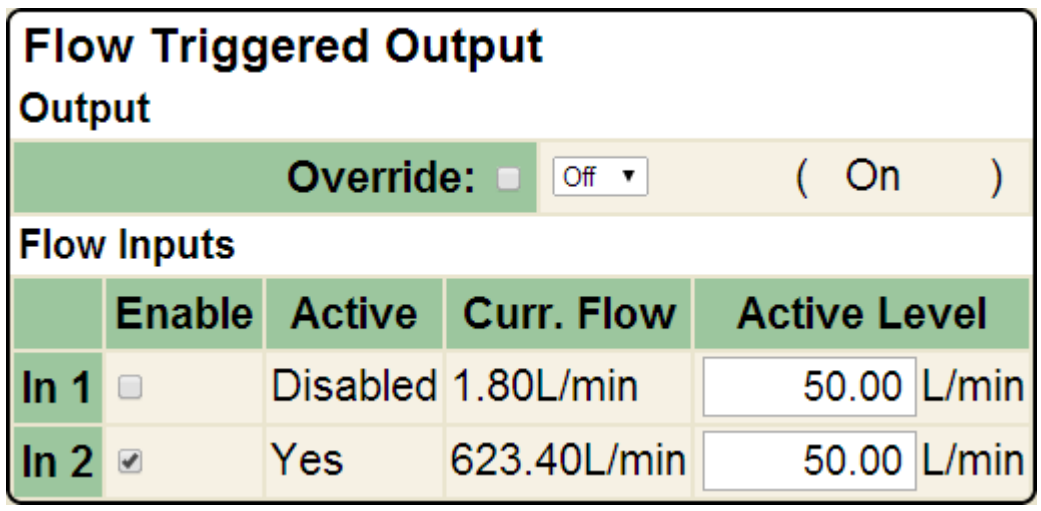
Lower

- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Raise

- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Flow Triggered Output



Override: Ticking this box will override the output to the state specified in the drop down box.

Enable: In order to use a configured flow input as a trigger for this output it must be enabled.

Active: Has the current flow level meet the required level in order to turn on the output.

Curr. Flow Current flow rate being report by the configured input.

Active Level: The level the flow must reach before it is deemed to actually be active and the output to be turned on.

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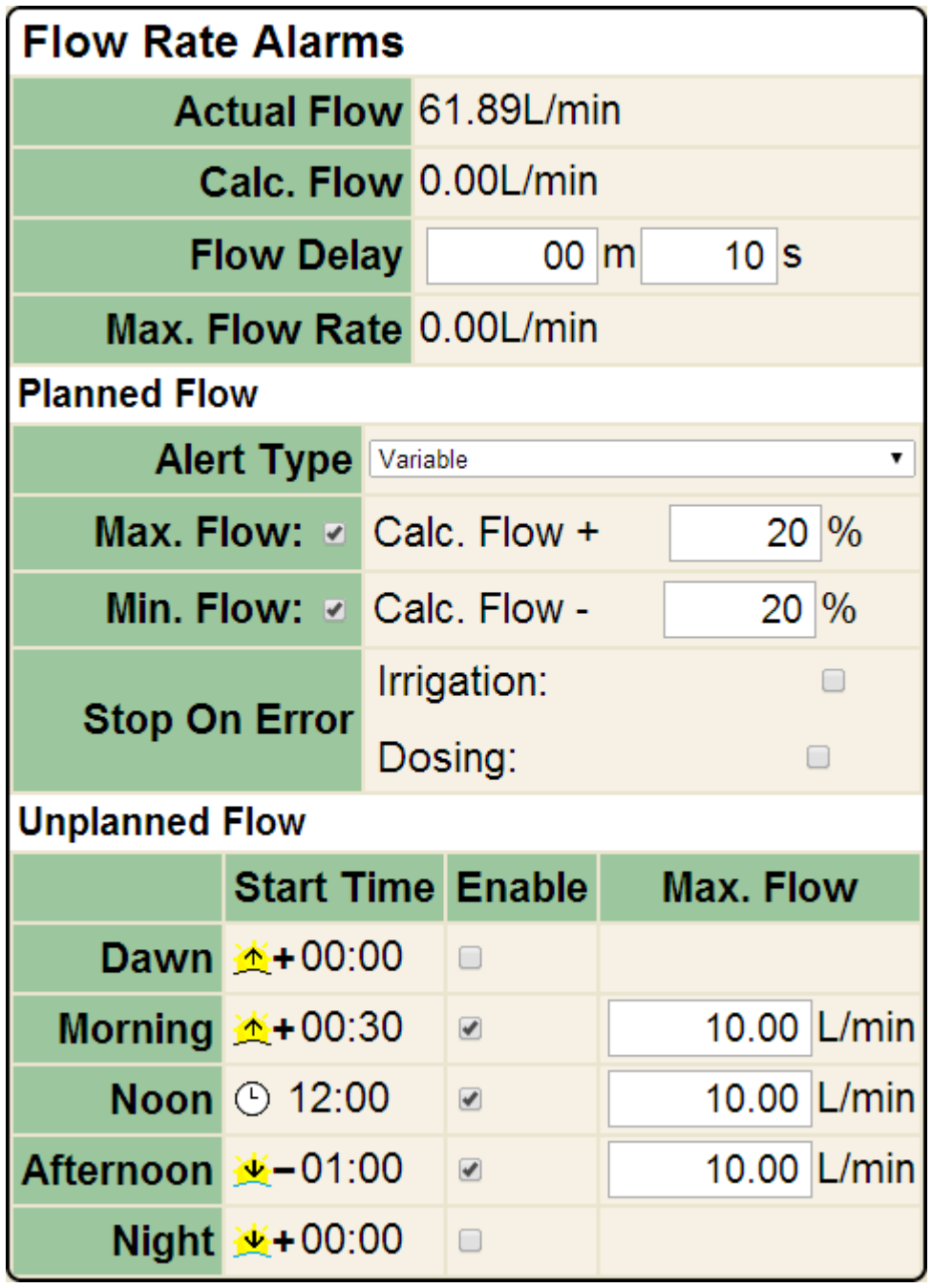
Flow Rate Alarms



This box will on be visible if the system has a mesaure flow meter properly configured. Though there is a separate alarms tab located on the settings page that is used for generic alarm settings rather than specified levels. An irrigation system has two flow rate alarms that become active under different conditions (Planned and Unplanned).

Actual Flow: Current flow rate being measured by the system.

Calc. Flow: The current flow that should be present on the system derived from the station flow rate settings.

Flow Delay:: When a system begins to water it can take a small amount of time for the pump to spool up. This lag can also happen when the flow is changing due to stations size. This setting lags the measurement by this factor to stop incorrect alarms being generated.

Max. Flow Rate: Current maximum flow rate expected on the system given its current state of operation.

Planned

A Planned flow alarm becomes active when we are expecting flow to be present on the system e.i a irrigation has become active. The system can be configured to generate both minimum and maximum flow rate alarms based on the flow of the system. The flow rate variable configured for each station is compared to the current flow rate being measured if this various by a certain amount an error is said to have occurred and an alarm should be generated. When an event such as this occurs it is possible to stop the Dosing modules on the system if installed and or stop the irrigation completely.

Alert Type: The type of alarm used for planned flow.

- ***Disabled:*** No planned flow alarms will be generated.
- ***Variable:*** The minimum and maximum flow levels vary depending on the calculated flow rate of the system.

  Max. Flow: Ticking this box means that the maximum planned flow rate alarms are enabled on the system. If the actual flow is ever above the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Max level will still be used by this will be set to a range that cannot be reached by a irrigation system.

  Min. Flow: Ticking this box means that the minimum planned flow rate alarms are enabled on the system. If the actual flow is ever below the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Min level will still be used by this will be set to a range that cannot be reached by a irrigation system.

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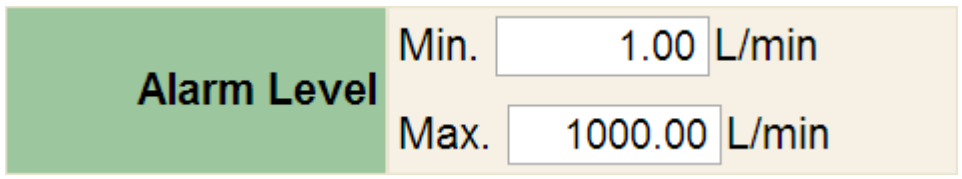
- ***Set Levels:*** The minimum and maximum flow level are fixed and the actual flow rate is compared to these directly.



Min.: Minimum flow rate allowed on the system when irrigating. If the actual flow drops below this for a certain time, generate an alarm.
Max.: Maximum flow rate allowed on the system when irrigating. If the actual flow rate goes above this for a certain time, generate an alarm.

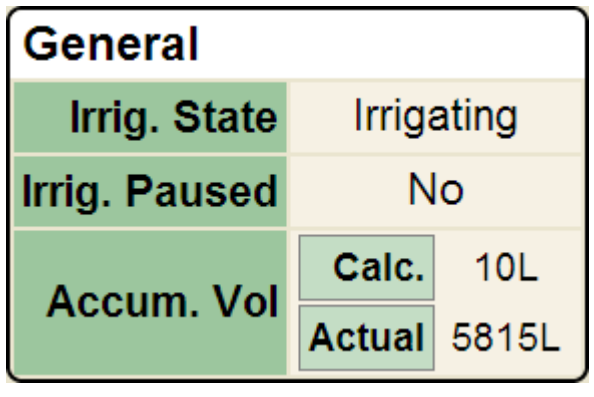
Stop On Error: When an error occurs on the system it is possible to stop either the Dosing Modules or entire irrigation system.

Unplanned Flow

A Unplanned flow alarm becomes active when we are not expecting flow to be present on the system e.i when there is no active irrigation. The system can be configured to enable this alarm per time period. It is also possible to set the level of flow required per time period in order to validate the alarm. If the actual flow rate is above the Max.Flow level for a specific amount of time and it is enabled an alarm will be generated. Note the time period enable needs to be saved in order to see and edit the Max. Flow variable.

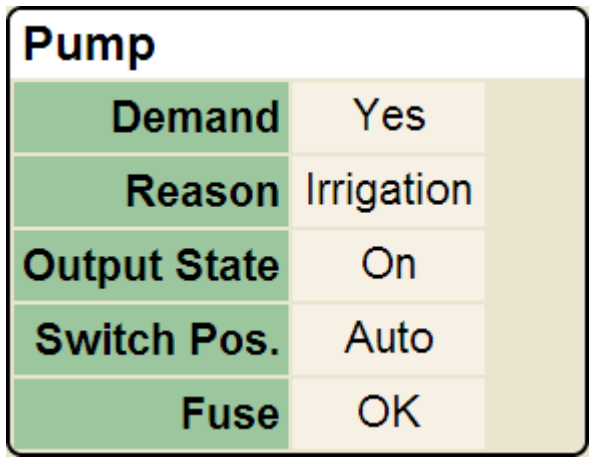
Readings

General



Field	Description
Irrig. State	Current state of the irrigation system. This can be driven from multiple installed functions
Irrig. Paused	Is the irrigation system currently in a paused state.
Accum. Volume	Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.

Pump



Field	Description
Demand	Is there current;y any demand in the system the means the pump should be running.
Reason	This field is only visible when a demand is active there are only a few source that can demand the pump to run, *Irrigation:* an irrigation is active on the system. *Filter:* The run pump on filter flush setting has been selected and the system is currently flushing. *Batch:* The batch system is calling for the pump to be active, this means the run pump while filling or stirring settings have been selected and the batch module is currently performing one of these actions.
Output State	The current state of the output for the pump, *On* or *Off*
Switch Pos	The switch position of the pump output, *Manual* or *Auto*

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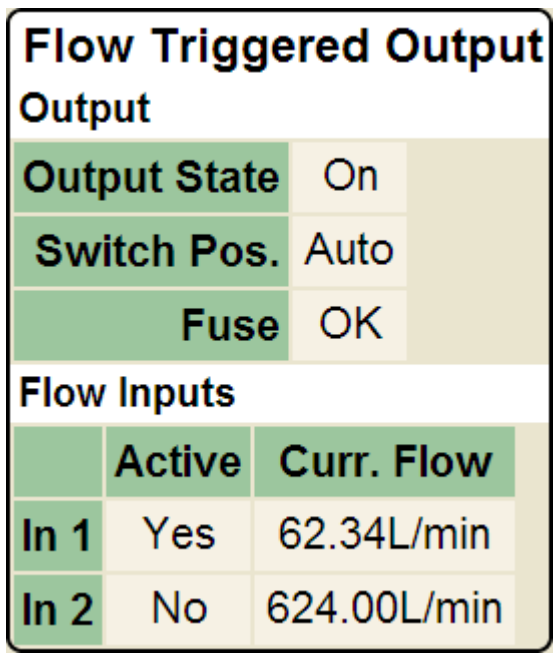
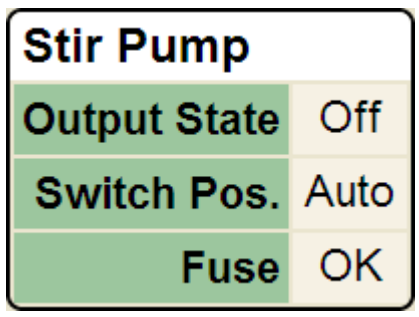
Field	Description
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Flow Triggered Output



Field	Description
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*
Active	Is the configure input sources flow reached the desired level to turn on the output.
Curr. Flow	Current flow being report from the configure sensors for this flow input.

Stir Pump



A stir pump can only be configured on an Inline dosing irrigation system and has been properly configured under the Configuration -> Dosing section. It will become active when the system is running an irrigation in order to help stir nutrient and pH injections through the output going water.

Field	Description
Output State	The current state of the output for the stir pump, *On* or *Off*
Switch Pos	The switch position of pump output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

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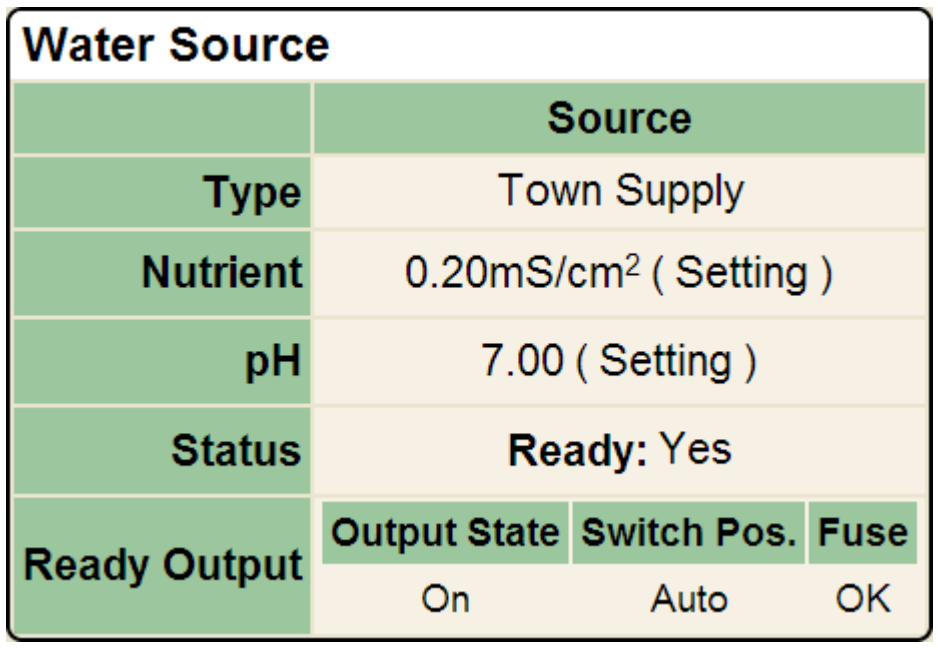
Water Source

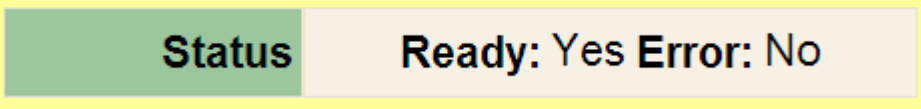
General Readings



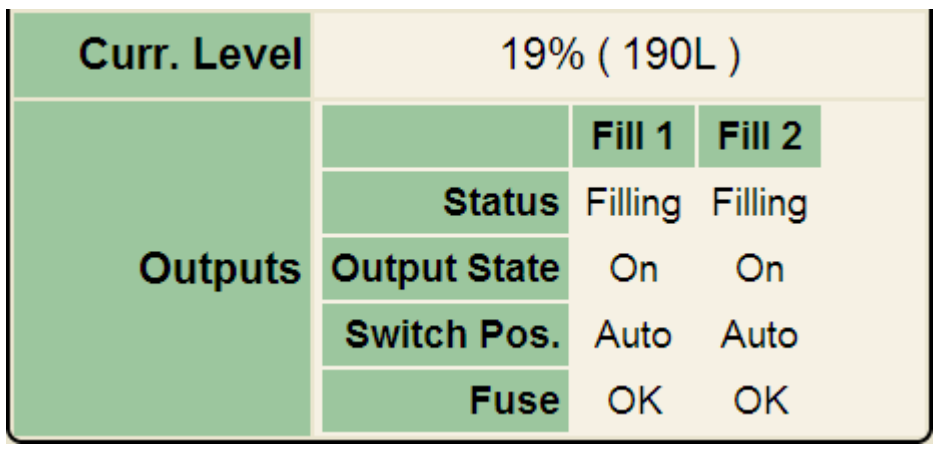
Depending on how a water source is configured the displayed information in this box will vary. Above visible readings for a town water source these are common readings among all types of sources.

Field	Description
Type	The current type of the configure water source, *Town Water* , *Tank* , *Blending Tank* or a *Main Tank*.
Nutrient	The current water source nutrient level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
pH	The current water source pH level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
Status	Whether the water source is ready. Note a town water source is always ready.
Ready Output	If a ready output has been installed on the water source the outputs information will become visible here. **Output State** The current state of the output for this injector, *On* or *Off*. **Switch Pos** The switch position of this injectors output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

If a water source has been configured as a tank or blending tank the status box mentioned above will contain a an error reading as well to indicate whether the current tank has an error condition present.



Tank Readings



Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field all the current readings for each fill output configured on tank are displayed. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the output for the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

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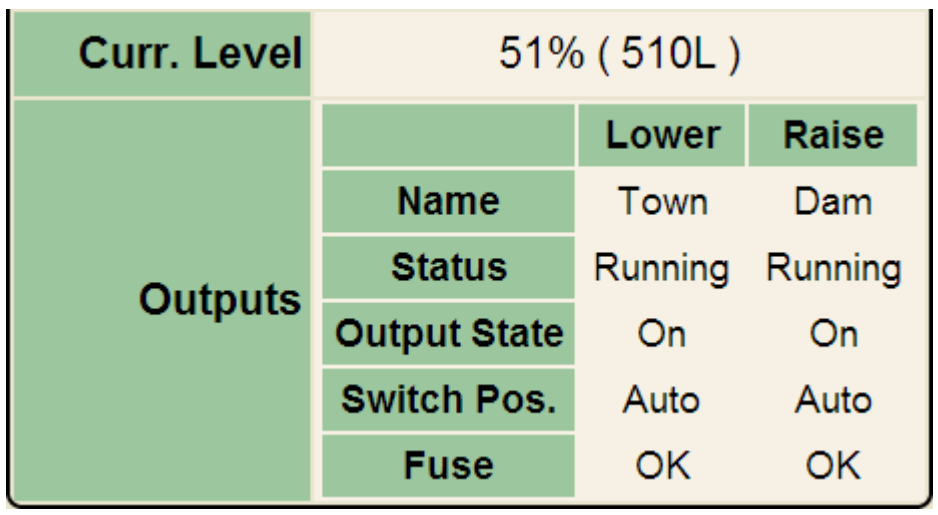
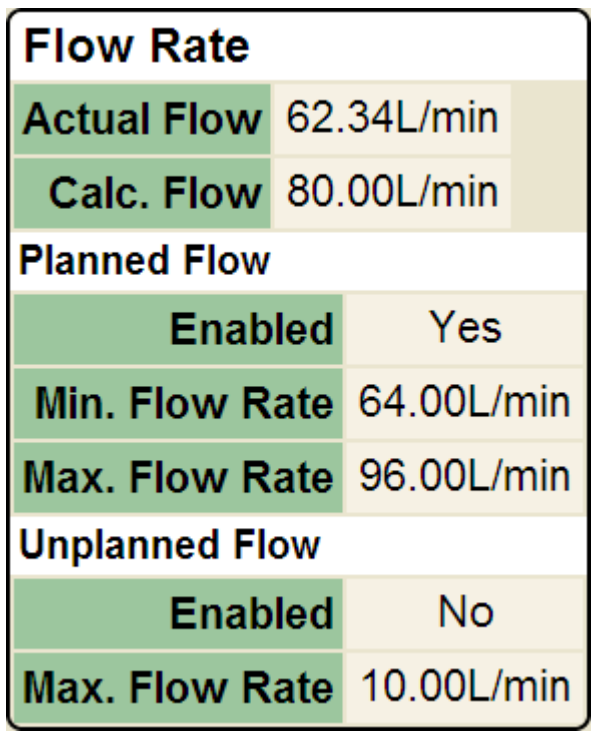
Blending Tank Readings



Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field the lower and raise fill output readings are displayed. **Name** Unique identifier given to this output. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

Flow Rate



For this box to be visble a flow meter must be correctly installed and configured on the irrigation system.

Field	Description
Actual Flow	Current flow rate being measured from the configure sensor source.
Calc. Flow	Current calculated flow the system is expecting to see based on its current state.
Planned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Min. Flow Rate	The minimum flow the system is allowed to have with generating an alarm condition, this is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Unplanned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on alarm level settings.

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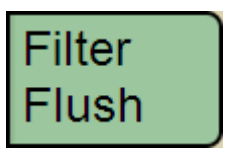
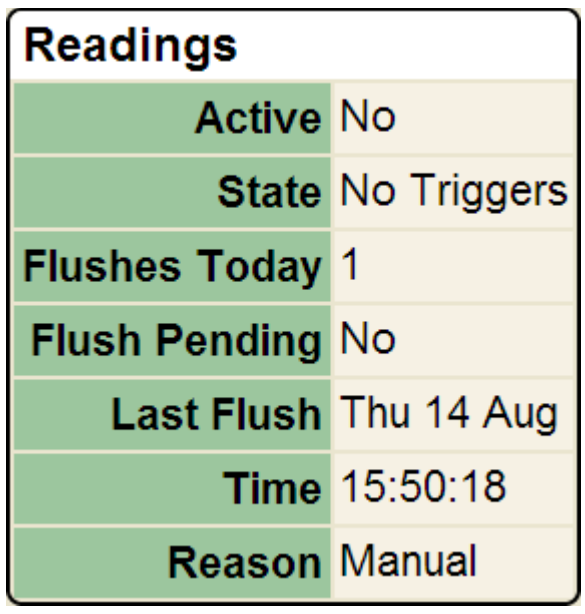
Filter Flush



If a filter flush is installed on the system a separate tab will be appear on the tertiary menu. When a filter flush is occurring the system is running water backwards through the pump. This means that irrigation's will be paused or unable to start during this period.

Settings

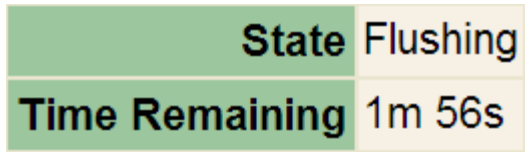
Readings



Active: Is the filter flush currently active.

State: Current state of the filter this can differ from the active reading and reflects other aspects of the filter flush system.

Time Left: Time remaining for the active filter flush cycle, this will only be displayed if the system is currently performing a filter flush.



Flushes Today: Number of flushes that have occurred today since midnight.

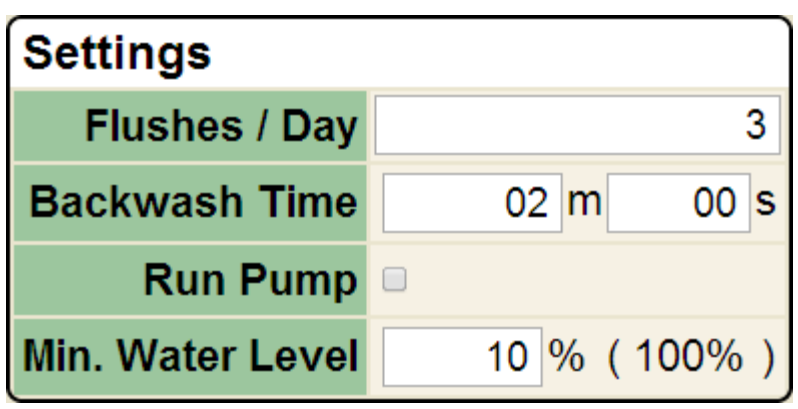
Flush Pending: If there is a flush pending the trigger source will be displayed here, a trigger can only be pending if the use of a flush window otherwise flushes will happen whenever they are demanded. If multiple triggers have occurred before the filter flush can run, the sources will be listed here.

Last Flush: Date of the last filter flush.

Time: Time when the last flush finished.

Reason: the trigger source for the last flush.

Settings



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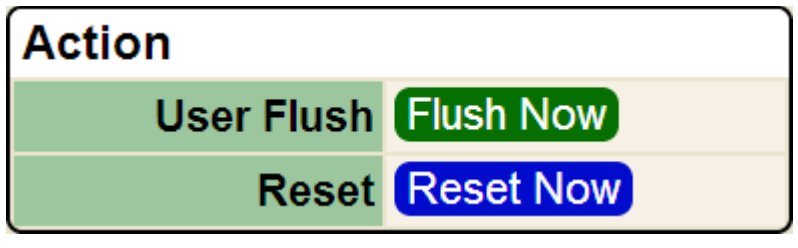
Flushes / Day: This sets the amount of flushes allowed per day, this is a maximum set point that can not be exceeded by any of the flush triggers except for a manual flush.

Backwash Time: The time it takes to run water backwards through the filter in order to flush it properly. This is time is sometime giving by the filter manufacturer. It may also be specified as a volume.

Run Pump: If this box is ticked when a filter flush becomes active the main system pump will also be turned on.

Min. Water Level: If a tank is the source water for the flush it might required more water then what is currently in the tank. Using this value it is possible to specify the amount of water that must be present from the water source in order to run a flush, otherwise it will not happen.

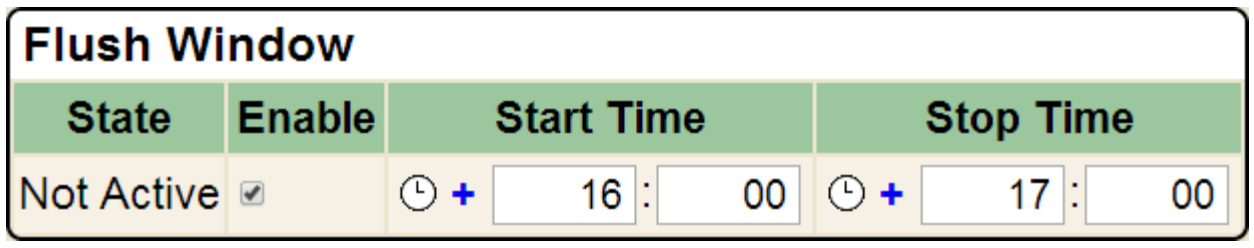
Action



User Flush: Triggers an immediate filter flush regardless of the state, once a filter flush has been activated this button will change to a cancel button, which will immediately stop the active filter flush.

Reset: Pressing the reset button will reset all automated triggers back to zero.

Flush Window



The flush window enables a set time of day for automatic flushes to occur. If a window is enabled the volume and interval triggers can only run between the time specified.

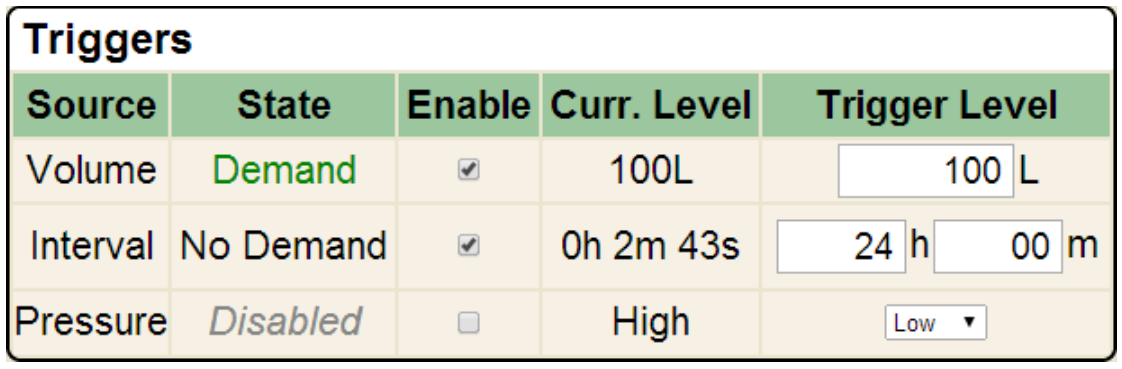
State: Current state of the window.

Enable: If a flush window is to be used on the system this value must be ticked.

Start Time: Time when the window starts, this can be a set time or an offset from sunrise/sunset.

Stop Time: Time when the window ends, this can be a set time or an offset from sunrise/sunset.

Triggers



There are three sources that can trigger a filter flush within an irrigation system. Both the Volume (actual only) and Pressure triggers required sensor input, if they are not installed a No Sensor error message will be displayed. The Volume and Interval triggers are bound by the flush window, so will only trigger during the window if enabled. All the triggers are also bound the number of flushes per today as well as the water source level. If any of these conditions are not meet but a trigger is demanded a Demand message will be disabled. Once a flush has completed the current levels will be reset, except for the pressure level since that is driven directly from a sensor. If any of the triggers are *Disabled* they will not be able to trigger.

Volume
A volume triggered filter flush is driven from either the calculated or measured volume on the system. If the measured volume is being used a flow meter must be correctly configured on the system.

Interval:
This is a simple time based triggered once a certain amount of time has passed since the last filter flush a new trigger will be generated.

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Pressure
This is driven directly from a pressure sensor installed onto an EpM sensor within the system, this must be properly configured for this trigger to work.

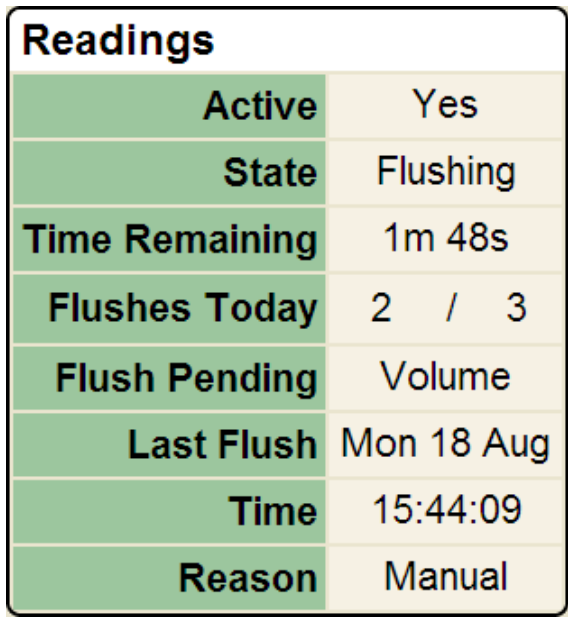
State: Current state of the trigger.

Enable: This box must be ticked if the source is to be used as a trigger.

Curr. Level: Current reading of the source.

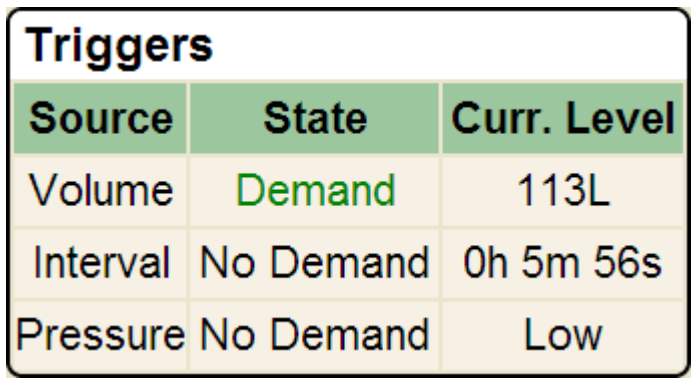
Trigger Level: Level the source reading is compared to in order to generate a trigger.

Readings



Field	Description
Active	Is a filter flush currently being performed by the system
State	Current state of the filter flush module.
Time Remaining	This reading will only be displayed if a filter flush is currently active on the system. It displays how long is left until the flush cycle has completed. This is reset to zero when the system reaches its end of day.
Flushes Today	Number of flushes that have occurred today out of the maximum total allowed.
Pending Flushes	If a flush window has been configured on the system or the number of flushes has been exceeded any triggers will be queued until it will be allowed to run again. The source of this queued flush will be displayed here.
Last Flush	Date of last flush performed by the system.
Time	Time of the day the flush occurred.
Reason	The trigger reason for this flush.

Triggers



Field	Description
Volume	State of the volume trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Volume	State of the interval trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Pressure	State of the pressure trigger on the filter flush module, this will only be displayed if the pressure trigger has been correctly set up on the water system configuration page. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level is driven directly from a sensor input and will only change based on physical feedback from the pressure sensor.

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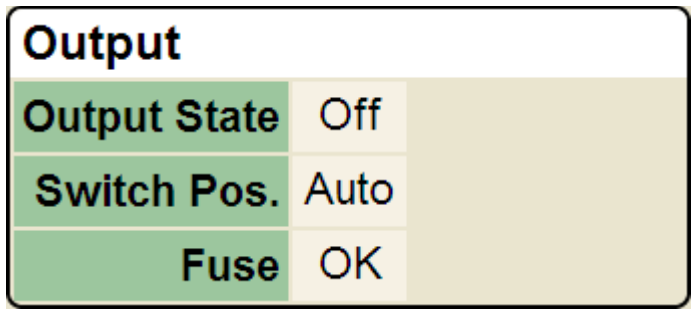
Outputs



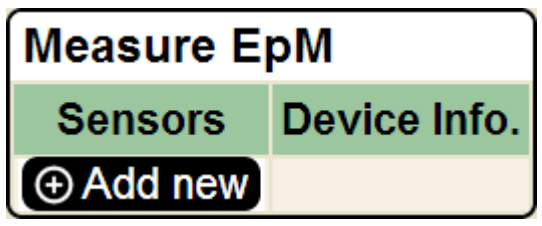
Field	Description
Output State	The current state of the filter flush output, *On* or *Off*
Switch Pos	The switch position of the output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Sensors

Each irrigation system can have a three different groups of sensors used for ob

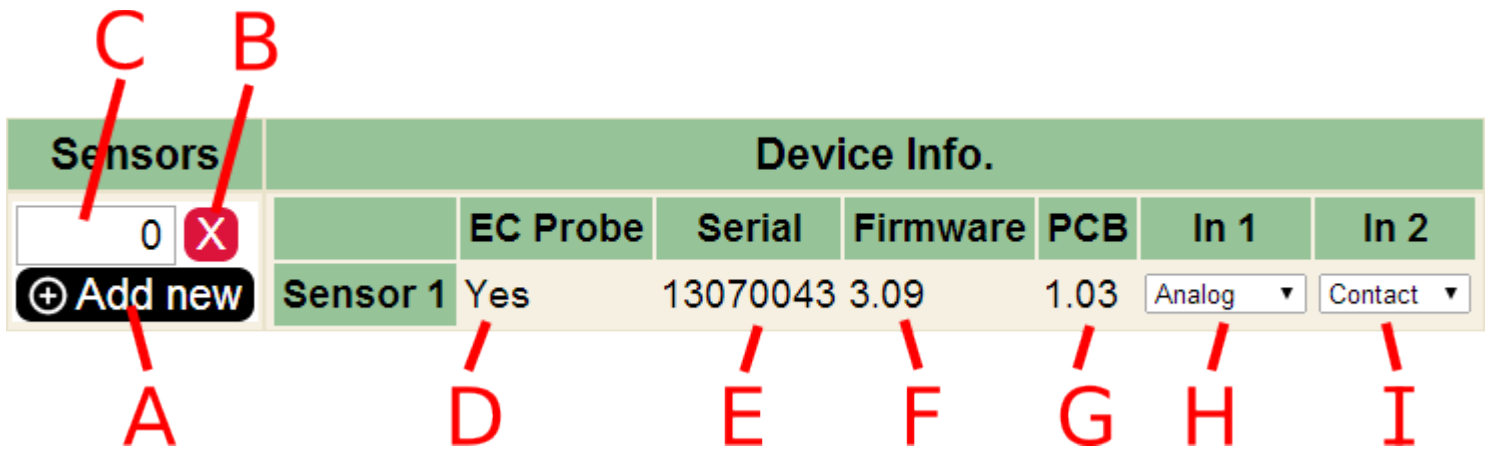
Configuration

Measure EpM



This is the group of readings designated for the main readings of the system. This group reports the Main Nutrient, pH and Flow for the system.

After adding a new Remote EpM to the sensor box the Sensors field and the device info. box will change.



Annotation	Name	Description
A	**Add new button**	Adds an EPM sensor
B	**Delete button**	Deletes an EPM sensor
C	**Sensor address**	The address of the sensor. Each box must be populated with the corresponding address of the EpM device
D	**EC Probe**	Does the Remote EpM currently have an EC Prove attached?
E	**Serial**	Serial number of the device connected under that address
F	**Firmware**	Current version of the firmware this device is running
G	**PCB**	PCB version of the device
H	**In1**	• **Contact:** Input 1 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to 5 - 10V when contact is made • **Analog:** Analog voltage is connected to input 1 of sensor • **Moisture:** Moisture probe is connected to Input 1 of sensor

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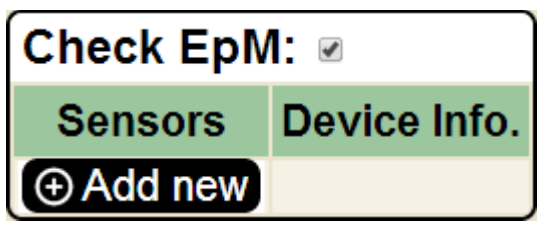
Annotation	Name	Description
I	**In2**	• **Contact:** Input 2 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to ground when contact is made • **Flow:** Input 2 is a flow meter input, again this should be pulled to ground when contact is made for correct operation

Sensor information is only available once the configuration has been activated by pushing the **Activate** button

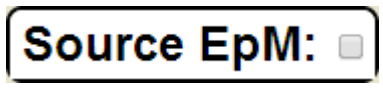
Check EpM

The Check EpM group is used for mainly error checking against the Measure EpM reading. It can also provided general contact closure inputs as well as analog inputs.

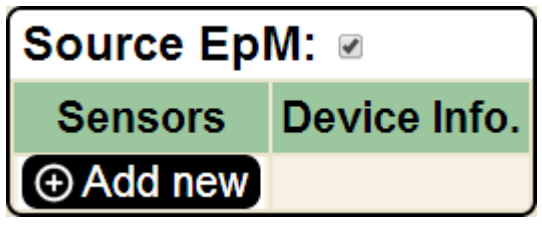


Check EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Source EpM

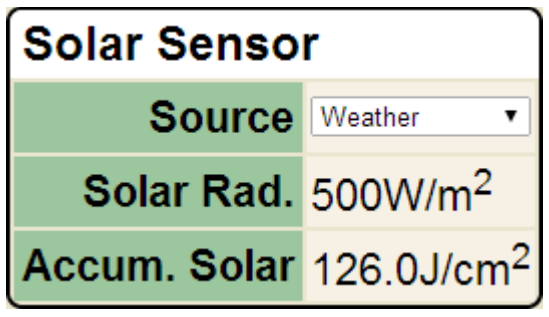


The Source EpM group is mainly used for input information to the system. I can be used to measure the incoming nutrinet and pH level of the systems water supply. It can also provided general contact closure inputs as well as analog inputs.



Source EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Solar Sensor



An irrigation system can have a solar source assigned to it which can be used through the system.

Source: Here the solar source can be specified, depending on which source is selected additional configuration options will be displayed.

- ***Weather:*** The systems solar information will be taking from the weather station.

  A Weather stations needs to be installed and properly configured for this option to be used correctly. See section config weather for information on this.

- ***Independent:*** The system uses the solar reading from a independent solar sensor.
- ***Compartment:*** The system will use the solar information from a specific compartment.

Solar Rad.: Current level of solar radiation that is being measured by the selected source.

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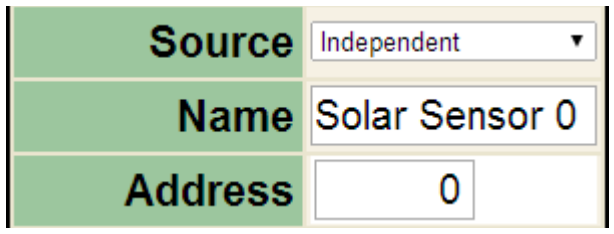
Accum. Solar: Accumulated solar radiation since last End of Day.

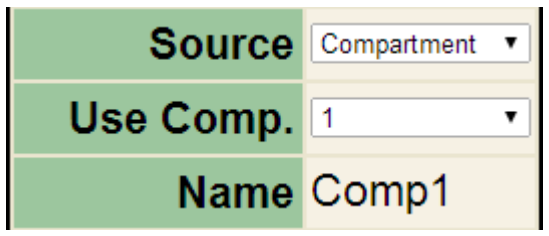
Independent Solar Source



Name: Text can be entered in this field to help identify the solar sensor attached to the system.

Address: The address of the rotary switch the desired solar sensor is set to.

Compartment Solar Source



Use Comp.: The number of the compartment that is to be used be system in order to get solar information must be entered here. In order to use a compartment as a solar source the compartment must be probably configured see configuring climate section for information on this.

Name: Each compartment can be configured to have a name, this will be displayed here to help ensure the correct compartment has been selected as the solar source.

Overview

The black button that appears in the row heading of the table is an expansion button, this button is given the name of the sensor number added to the system. When this button is pushed additional settings for each sensor will be displayed.

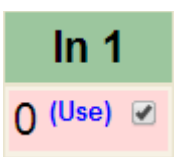
Field	Description
Nutrient	The current nutrient reading from the sensors. If this reading is 0.00 or XX check the connection of the EC probe to the Remote EpM sensors.
Temp.	Each Autogrow EC probe contains a temperature sensors which temperature is displayed here.
pH	Current pH being measured by the probe. Note that due to the nature of a pH measurement even without a probe connected a value can be displayed here.
Ext. Temp.	Current temperature being measured using the pipe temp sensor wired into the Temp pin of the Sensors B Connector. If a probe is not installed this temperature will appear of XX if a sensor is installed and XX is being displayed check the wiring of the probe.

In 1 & 2 Values

The values displayed in the Input 1 & Input 2 space will differ based on the In 1 setting on the configurations page, this needs to be set correctly to match the desired input signal. Since the type of variable can differ with the same column in the table each specific type of reading will be displayed in a different colour within the cell.

In 1:

- **CC Count 1:** Current count to contact closure input wired into Moist pin on connector B, the Contact options must be selected under configuration for this to be displayed.



- **Analog:** Current analog voltage being measured by the sensor. This will only be displayed if the sensors In1 value on the configuration page is set to Analog.

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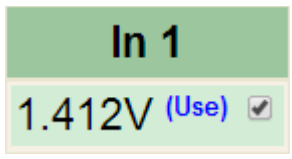
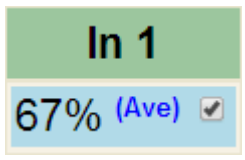
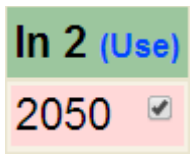


- **Moisture:** Current moisture level being measured by the sensors, the moisture option must be selected under configuration for this to be displayed.

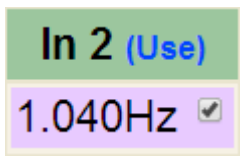


In 2:

- **CC Count2:** Current count of the CC input on the senosrs, this will only be displayed when contact option is selected under the In2 setting on the configuration page.



- **Flow Rate:** The raw flow rate in Hertz (frequency) that is being measured on the sensors. This is in relation to how many pulses a second the sensors is receiving (1 Pulse a second = 1 Hz). The Flow rate option must be selected under the In 2 setting on the configuration page for this to be displayed.



Some or all of the above values are Average Vars.

The addition of the above text and tick box means a variable is part of an averaged set. If the tick box is ticked this means the current reading and all other tick ones will be averaged together. This is useful in order to gain on overall sample of a particular reading. Any invalid readings (e.g. *XX°C*) are omitted from the average even if the box is ticked.

Some or all of the above values are Use Me Vars.

The addition of the above text and tick box means a variable is part of an use me set. If the tick box is ticked this means the current reading will be used as the main reading from the group of sensors. This is useful when multiple sensors within a single group are installed but only one is used for the specific reading. If multiple of the same use me vars are ticked, the system will use the value from the lowest sensor number as the reading (e.g. *Sensor 0 RH* will be used over *Sensor 1 RH*).

Additional Options

Each sensor can be individually calibrated in order to achieve the most accurate readings. Pressing the See All button will return you to the sensors overview page where other sensors additional options can be navigated to.

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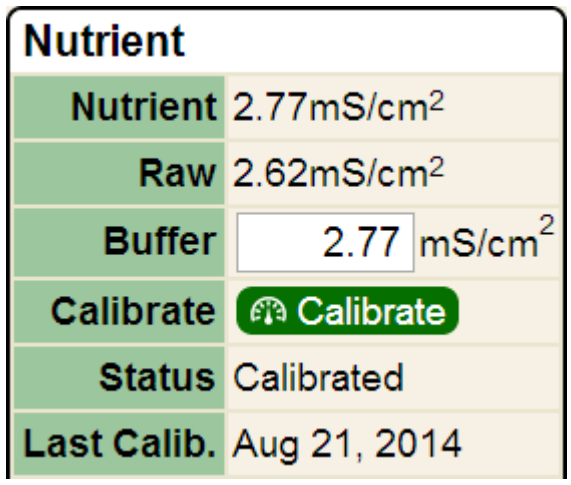
Nutrient

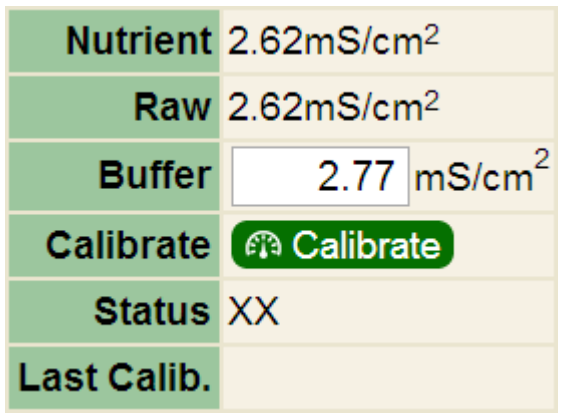


Field	Description
Nutrient	Current value of the nutrient, this is the value after the reading has been passed through the calibration it is the one that will be added to the average.
Raw	This is the raw reading coming from the sensor before calibration. This can differ from calibrated reading by quiet a lot. This value is displayed in order to give an indication of whether a new calibration should be performed.
Buffer	This is the calibration solution being used, default is 2.77mS/cm^2. This value can be changed to any value of buffer solution.
Calibrate	Pressing the Calibrate button will calibrate the current nutrient reading to the buffer solution set.
Calib	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

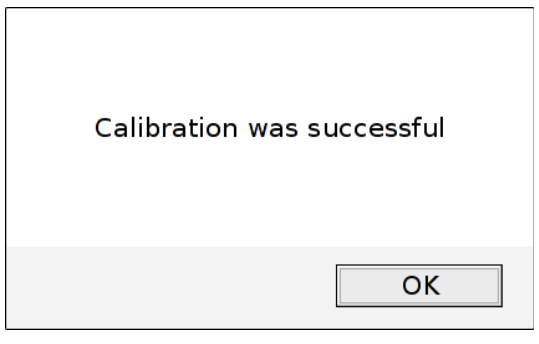
Nutrient Calibration Procedure

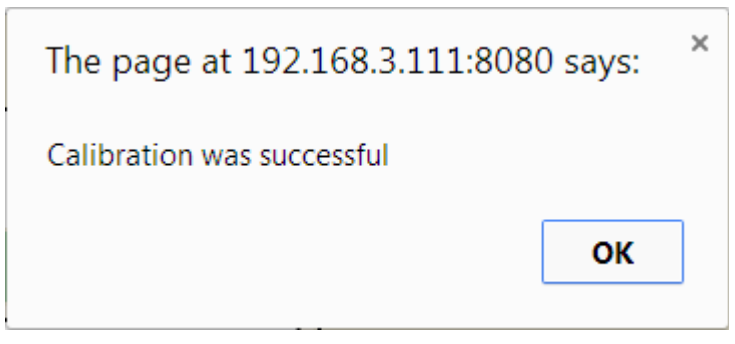
For each Remote EpM sensor within a group that is to be used for nutrient measurement it is recommended to calibrate the probes once a month.

- Clean & rinse the nutrient probe face
- Place the probe into the calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.



- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the nutrient and the temperature to stabilize (Recommended 5 Minutes).





- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.

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- After a successful calibration the Calib message and time will be updated.

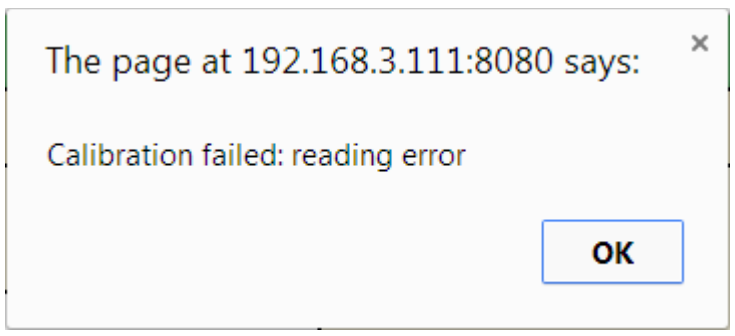
Nutrient	2.77mS/cm^2
Raw	2.62mS/cm^2
Buffer	2.77 mS/cm^2
Calibrate	Calibrate
Status	Calibrated
Last Calib.	Aug 21, 2014

Calibration Errors

- **No Probe**

Status	No Probe

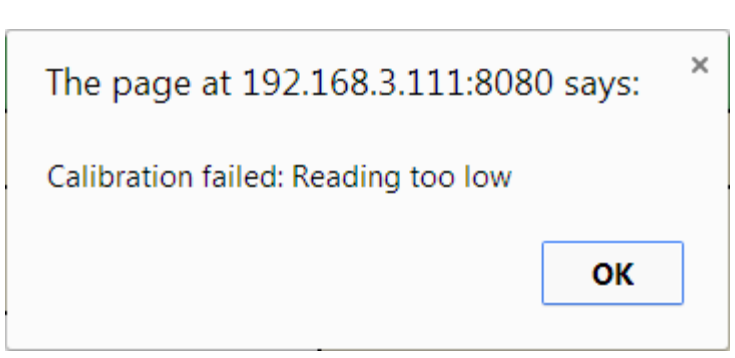
No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.

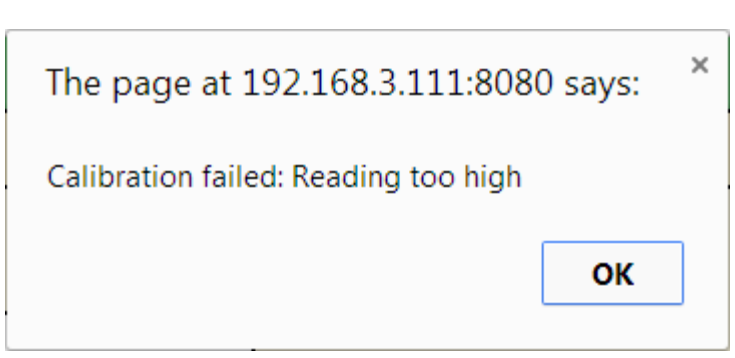


- **Out of Range**

Status	Out of Buffer Range

Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.





Nutrient Temperature

Nutrient Temp.	
Nutrient Temp.	26.8°C
Raw Temp.	XX°C
Offset	0.0 °C
Scale	100.00 %

Field	Description
Nutrient Temp.	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.

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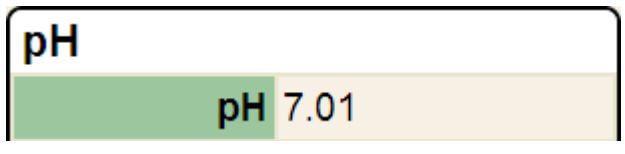
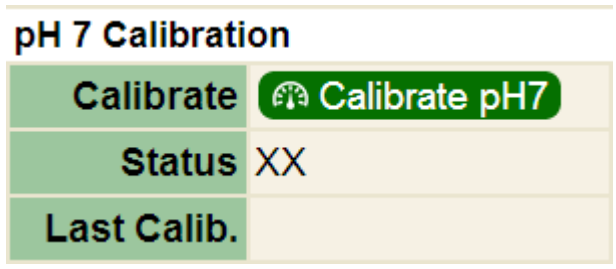
Field	Description
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

pH



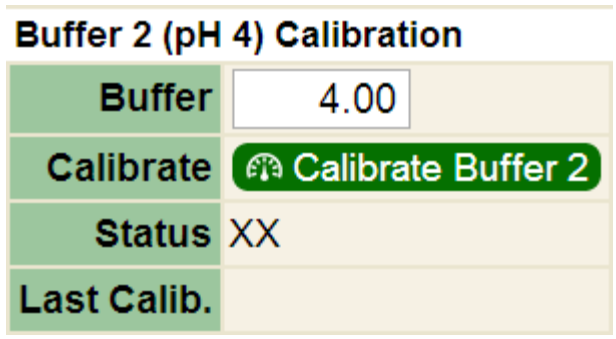
Field	Description
pH	Current pH value being reported by sensor.

Buffer 1 pH 7



Field	Description
Calibrate	Pressing this button will start a pH7 calibration.
Status	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Buffer 2 (pH4)



Field	Description
Buffer	pH value of the second buffer used in the pH calibration, this is usually a pH buffer of 4 but can be any other different pH level solution.
Calibrate	Pressing this button will start the second buffer calibration.
Status	Displays calibration information about the sensor.
Last Calib	Display the last calibration date for the sensor.

pH Calibration Procedure

For each Remote EpM sensor within a group that is to be used for pH measurement it is recommended to calibrate the probes once a week to compensate for aging electrodes.

- Rinse the pH Electrode in fresh water.
- Place the probe into the pH 7 calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

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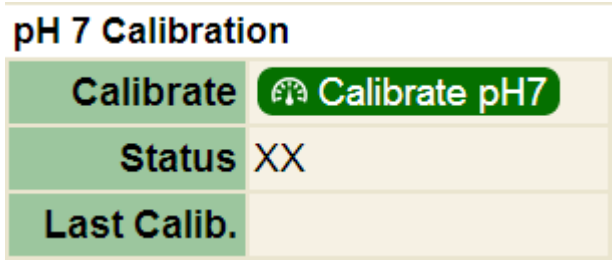
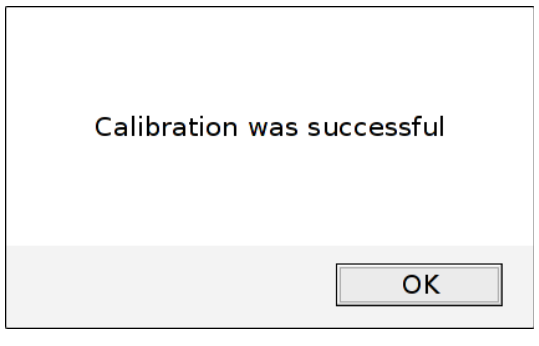
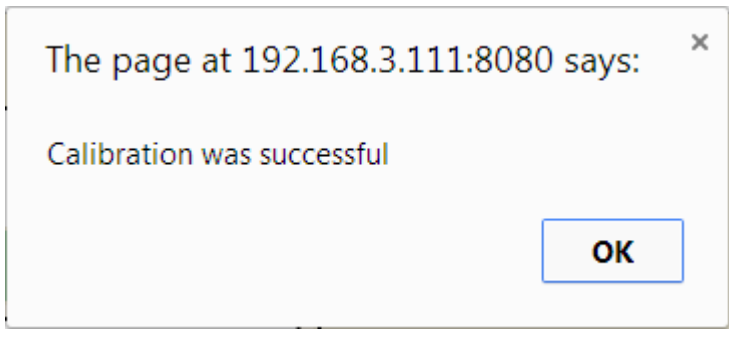
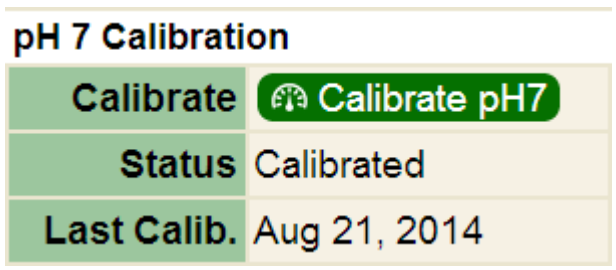


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).

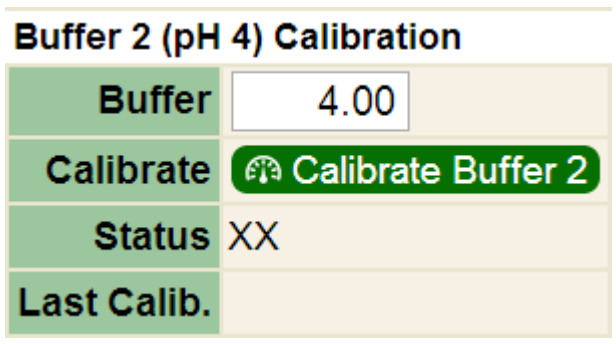




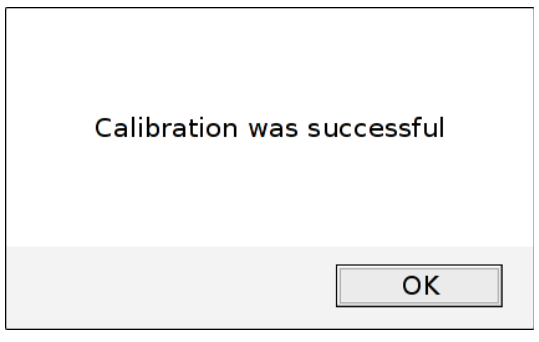
- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- Press the activate button before moving on to the second point calibration (pH 4).
- After a successful calibration the Calib message and time will be updated.

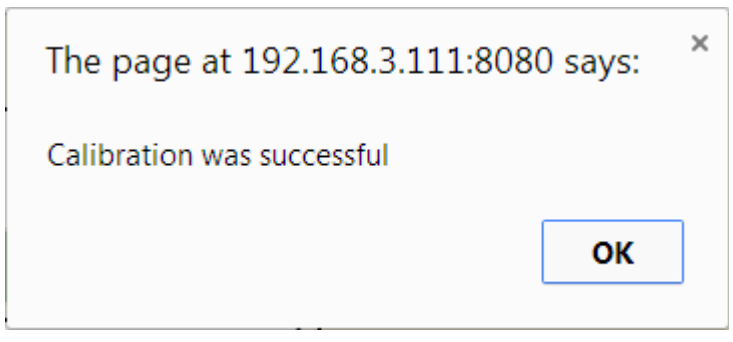


- Rinse the pH Electrode in fresh water.
- Place the probe into the second (pH 4) calibration solution.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.



- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).





- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

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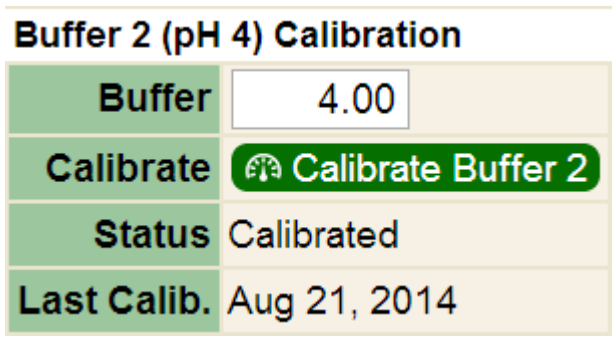
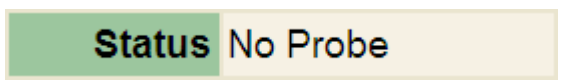
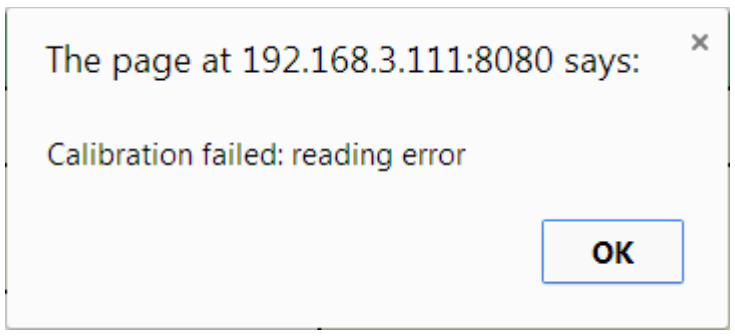


Calibration Errors

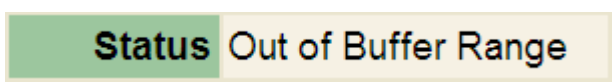
- **No Probe**



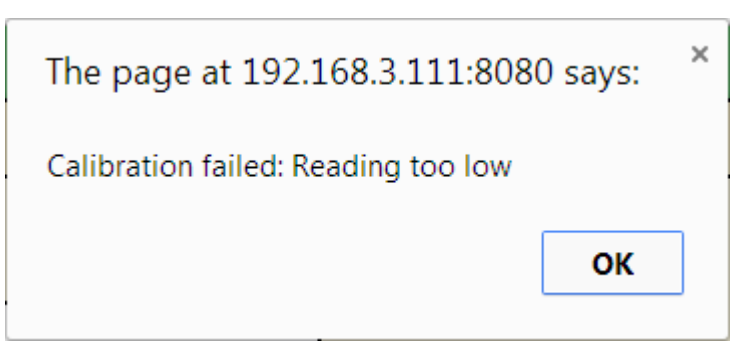
No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.

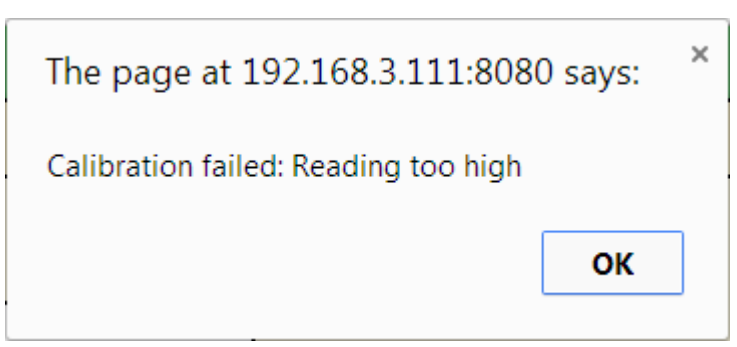


- **Out of Range**



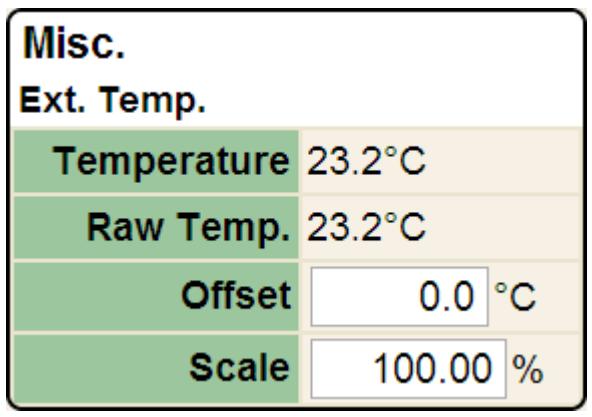
Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.





Misc.

External Temperature



Field	Description
Temperature	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.

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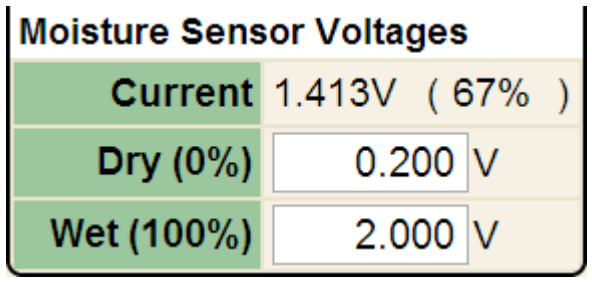
Field	Description
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

Moisture

The moisture probe options box will only appear if the input 1 type has been selected under the configuration page.

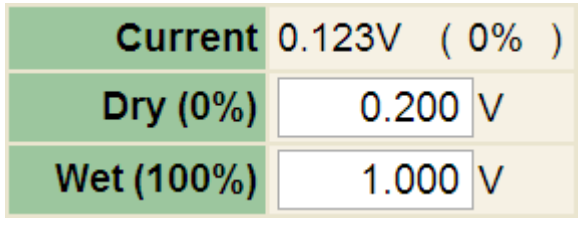


Field	Description
Current	Current voltage being measured by sensors from the moisture probe.
Dry (0%)	Voltage when probe is completely dry.
Wet (100%)	Voltage when probe is completely wet.

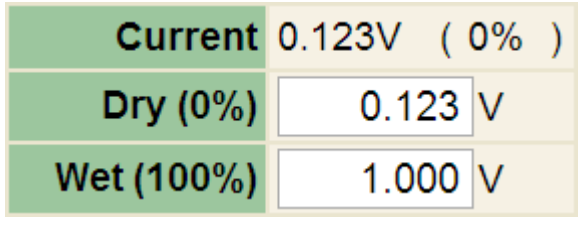
Moisture Probe Calibration Procedure

For each Remote EpM sensor within a group that is to be used for moisutre measurement it is recommended to calibrate the probes before using them, this usually only needs to be done once for a probe.

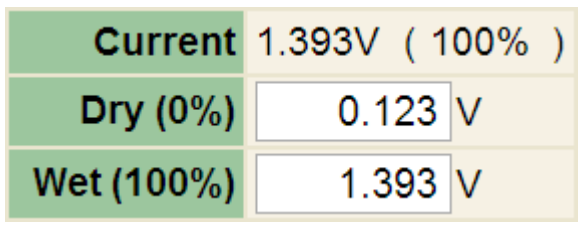
- First make sure the probe is completely dry.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate. And navigate to the Moisture Sensor Voltages box, note this will only be visible if the Input 1 type has been set to Moisture on the configuration page.



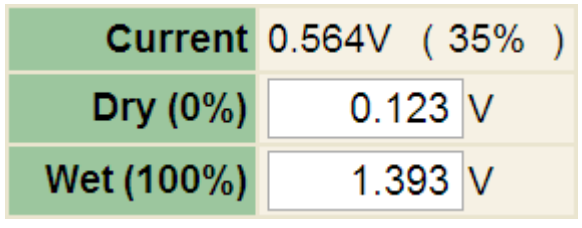
- Set the Dry setting value to match the current voltage being read from the sensor.



- Place the probe in to a glass of water, this is to ensure 100% wet of the probe for accurate calibration.
- Set the Wet setting value to match the current voltage being read from the sensor.



- Once these two settings have been enter, save and activate the settings to complete the calibration.
- Once completed the probe can be placed into desired media for normal operation.



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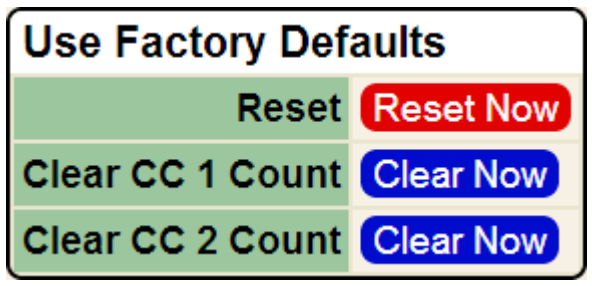
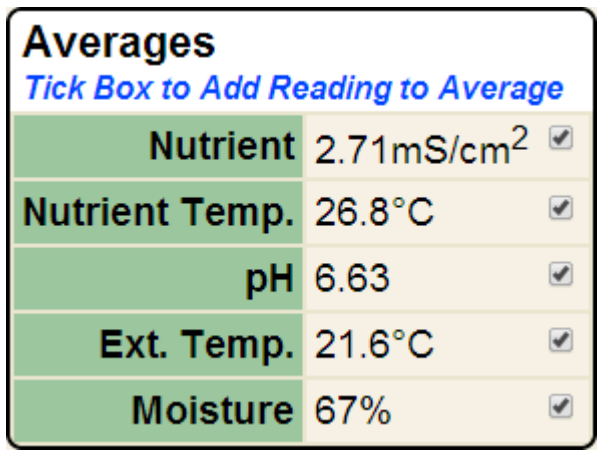
Use Factory Defaults



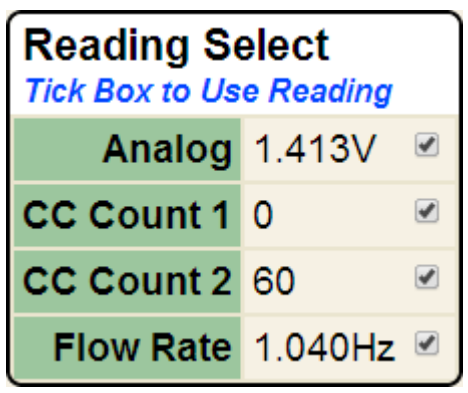
Field	Description
Reset	Pressing this button will reset all calibration constants for Nutrient and pH. This button will not effect the offset and scale settings.
Clear CC 1 Count	Manually reset the contact closure count of Input 1 back to zero.
Clear CC 2 Count	Manually reset the contact closure count of Input 2 back to zero.

Averages



This box lists all values that are supplied by a Remote EpM senosrs that can be averaged together. This will display variables even if they are not selected as an input on the configuration page.

Reading Select



This box lists all values that are supplied by a Remote EpM senosrs that can be select to be used as the main reading out of the set. This will display variables even if they are not selected as an input on the configuration page.

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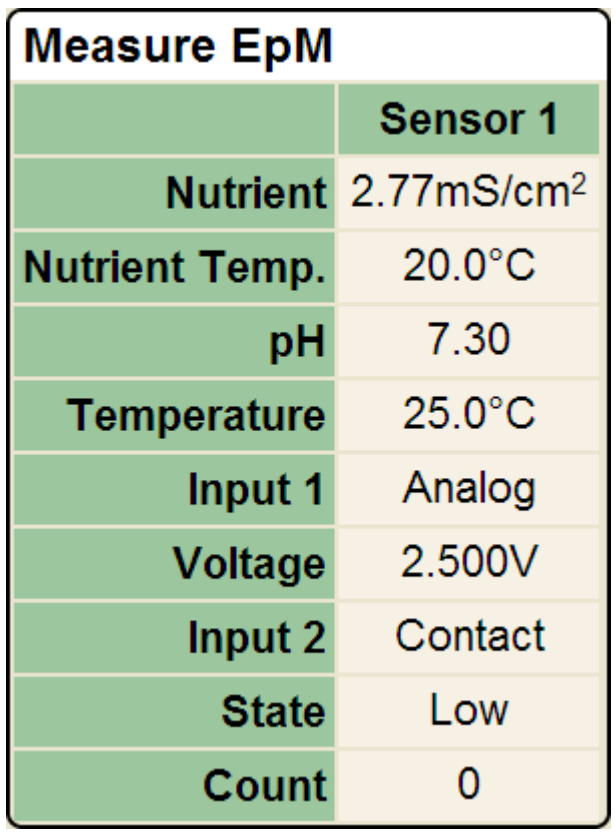
Readings

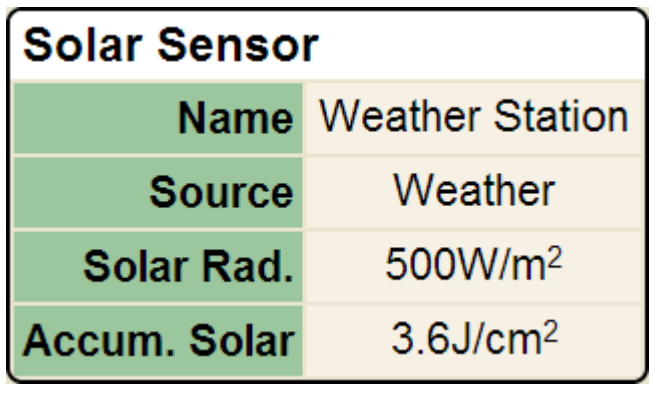
EpM Sensor's



The above field displays the readings for every sensor within the Measure EpM group. All the readings from each sensor and each group are the same as pictured above, this includes the Check and Source EpM groups.

Field	Description
Nutrient	The current nutrient reading from the sensor if this is every 0.00mS/cm&sub2 check the probe. A reading this low should not be possible if the probe is in water. A reading of this suggest the probe is no longer submerged in water.
Nutrient Temp.	Current temperature of the water the probe is submerged in. Note due to the nature of the material the probe is made from the thermal conductance of the probe is rather low, this means a change in temperature of the water may take a while to effect the actual temperature displayed here.
pH	Current pH level of the water.
Temperature	The temperature of the Stainless steel External temperature probe wired into the sensor this will appear as XX if not connected or an error has occurred.
Input 1	What the current input wired into the Analog input pin of the sensor is, this will only effect what is displayed in the box below.
Voltage / Moisture / Count	Depending on how Input 1 is configure the variable here will be listed accordingly. *Voltage* Current voltage on the input pin. *Moisture* Current moisture in percentage based on the sensor settings. *Count* Current count of the input pin.
Input 2	What the current input wired into the CC input pin of the sensor is, this will only effect what is displayed in the box below.
Count / Flow	Depending on how Input 2 is configure the variable here will be listed accordingly. *Count* Current count of the input pin. *Flow* Current calculated flow rate based on the frequency being supplied by the input.

Solar Sensor



Field	Description
Name	Name given to the solar sensor this will vary depending on the source
Source	Current solar source configured on the system on the Configuration -> Sensors page.
Solar Rad.	Current solar radiation reading being measured from the sensor. If this is XX check the sensor is correctly configured.

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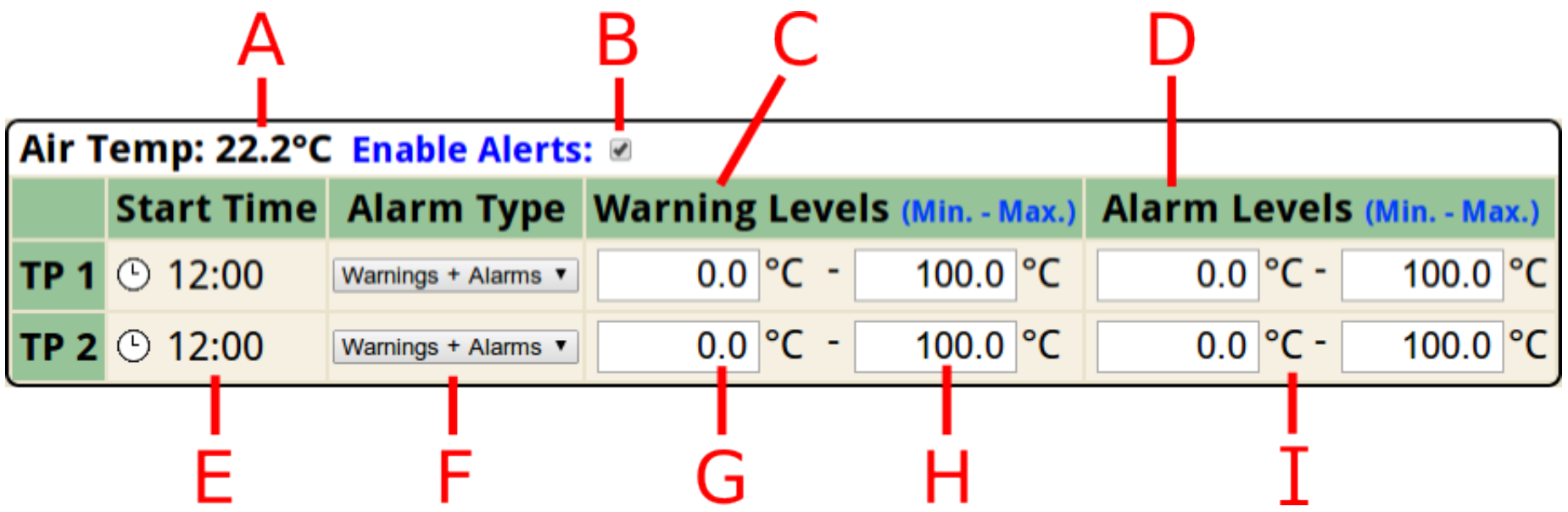
Field	Description
Accum. Solar	Accumulated solar for the system based on the configured solar source, this is reset at the systems end of day.

Alarms

For Irrigation you can set limits for Nutrient and pH levels per Irrigation System.

You can set alert limits for various readings in the system for both Alarms and Warnings under the Settings section by clicking on the Alerts tab.



Annotation	Name	Description
A	**Current Reading**	The current reading for the reading you wish to set an alert limit for
B	**Enable Checkbox**	If ticked, enables alerts for this reading
C	**Warning Levels**	This column shows limits that will raise Warning alerts
D	**Alarm Levels**	This column shows limits that will raise Alarm alerts
E	**Time Period**	The time period for which the limits are valid for
F	**Alert Type**	Per time period alert types, allows you to disable Warnings or Alarms or all alerts for the rows time period
G	**Min Limit**	The minimum value for a reading before an alert is raised
H	**Max Limit**	The maximum value for a reading before an alert is raised
I	**Unit**	The unit that the limit is measured in

Dosing Alarms

Since a continuous system doses one tank with a single program with a single nutrient and pH target, the alarms available for this system are Nutrient and pH level alarms set per time period.

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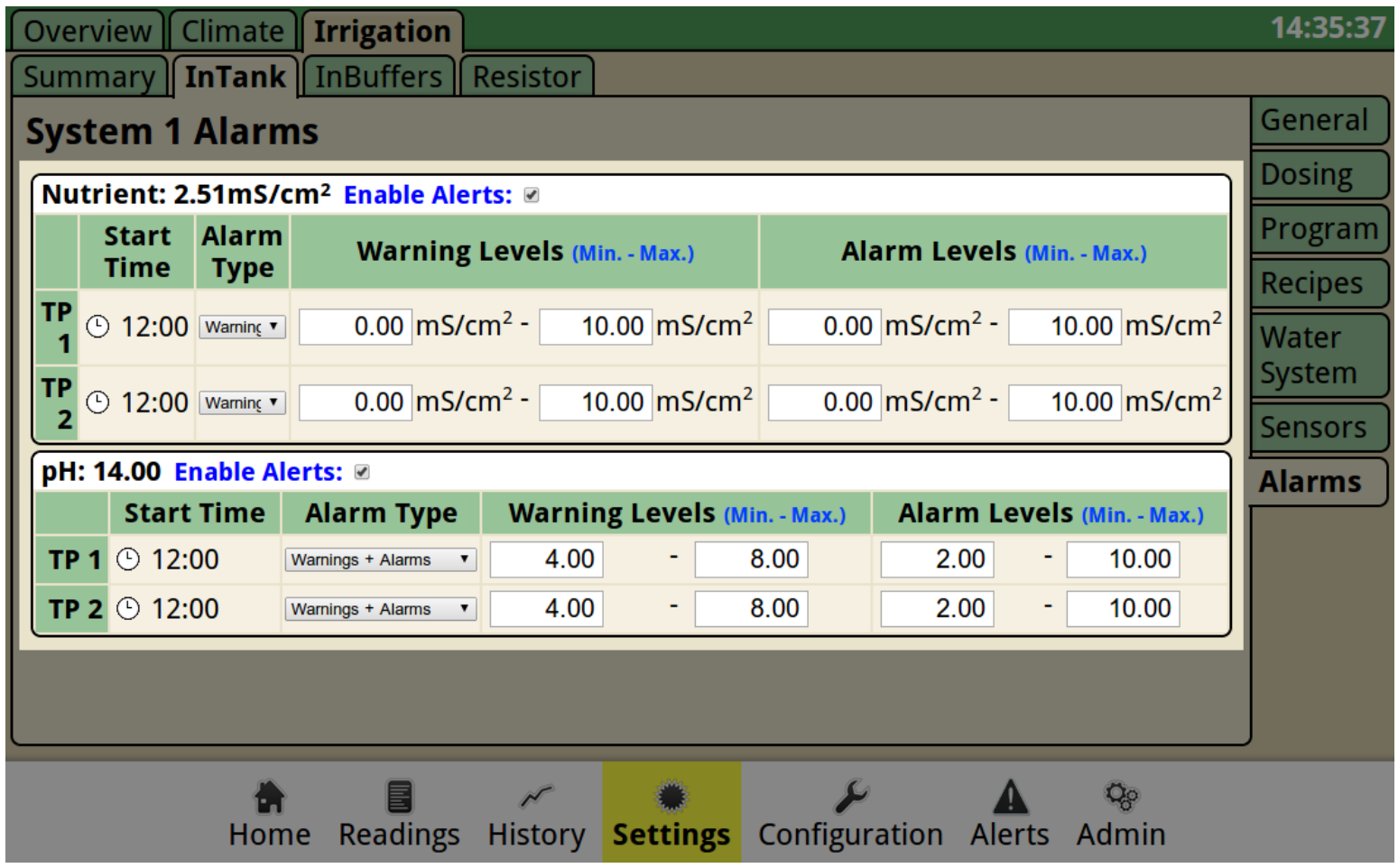


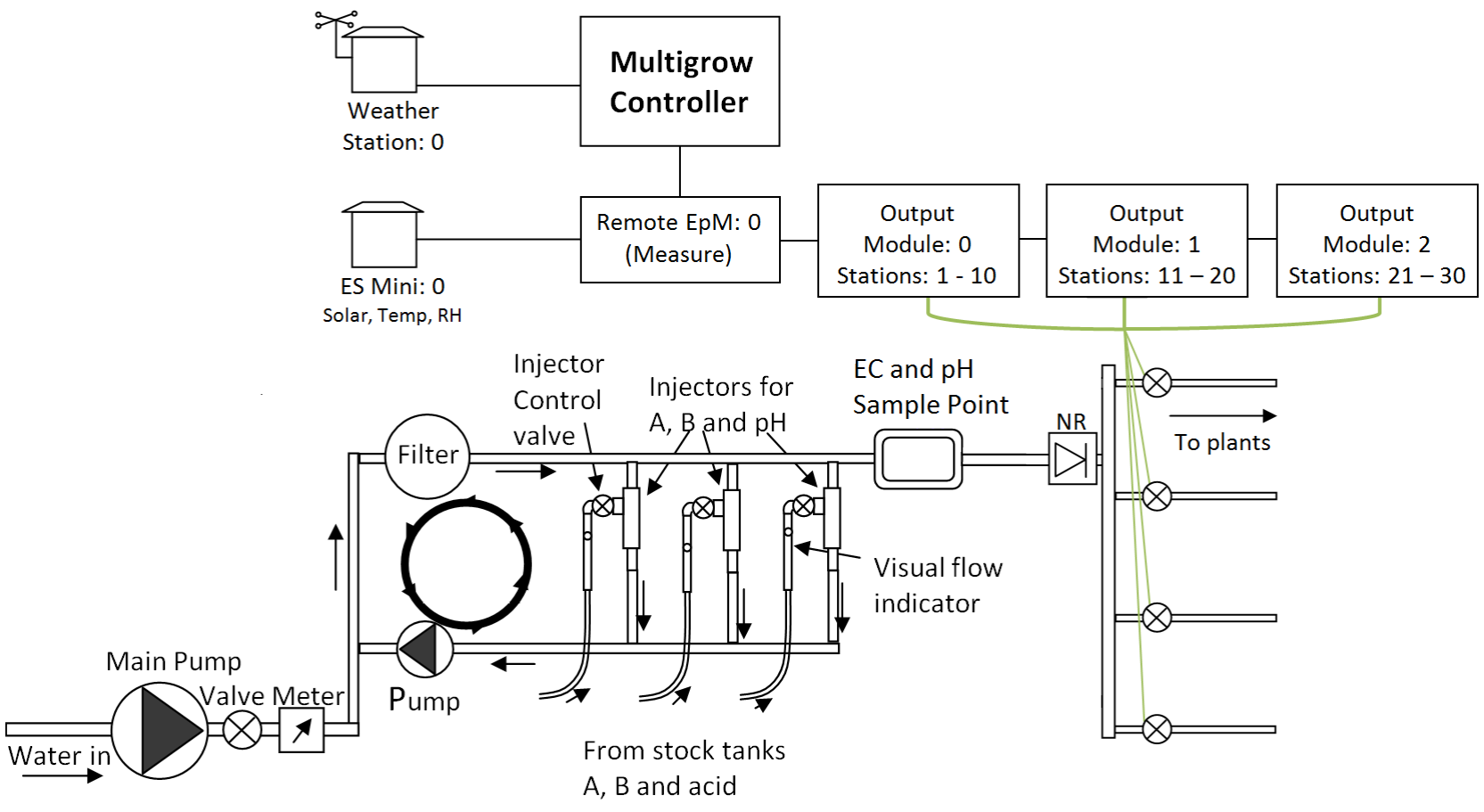
Inline System

The Multigrow system features inline fertigation control for up to 300 irrigation Stations (Zones). Each of the 300 stations can be assigned to 10 trigger groups. Each group having its own triggers, modifiers and irrigation program.

For straight fertigation, the controller doses Nutrients (up to 10 parts) and pH corrector using a closed loop, feedback method. When used in this way it can be programmed to select the nutrient mix from multiple stock tanks. This allows different zones to receive a different mix or even the same zone can be given a different nutrient mix day and night.

The injection into the line is done by venturi/solenoid (pwm) valves or simple on/off pumps. Each of these methods has cost, benefit and accuracy implications and the desired method should be carefully considered. Autogrow will be pleased to discuss these requirements for specific applications and can provide all ancillary equipment if required.

Typical system



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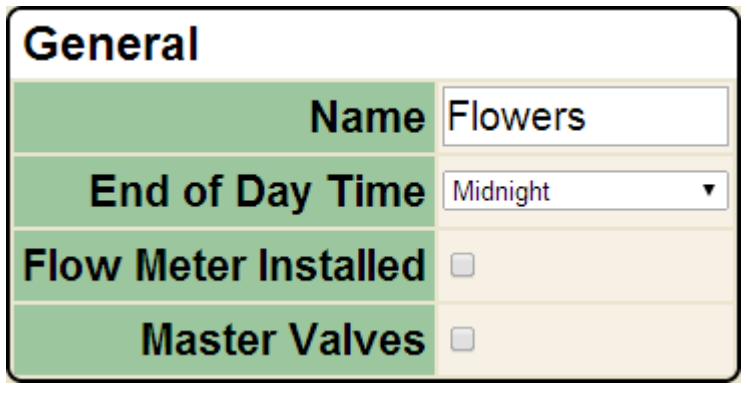
Configuration

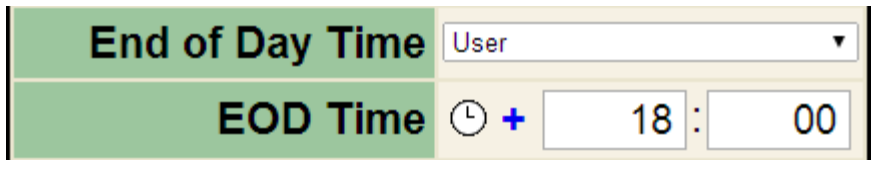
General

Each system has a number of generalized settings which can be found on the top tab settings or configuration page labelled as General, and the status tab on the readings page. These areas are used to display the current general information for the system and any generalized setting or configuration options which are not specific to a particular component within the system.



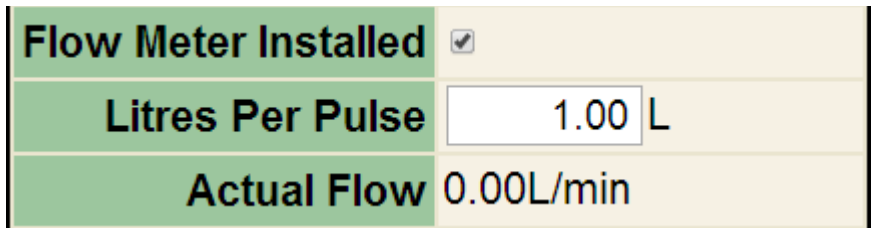
Name: Name for the current system, this is the same setting as found on the summary page.

End of Day Time: An Irrigation system has a few different readings which need to reset daily, this option allows you to select whether these variables are reset at Midnight local time or at a specific time of the day.



EOD Time: If the End of Day Time has been set to User this option will become available. Here a specific time of day can be used to reset specific readings.

Flow meter Installed: If the system has a flow meter installed that is used to measure the irrigation flow this box needs to be ticked.



Litres Per Pulse: This setting box is only displayed once the Flow meter Installed box has been ticked. Here the flow rate of the installed meter must be specified, this value should be specified by the manufacturer of the flow meter.

Actual Flow: This is the current flow rate being measured by the system.

> A Remote EpM sensor must be configured in the system before this reading will display correctly

Master Valves: If the system has master valves this box needs to be ticked in order to configure them. This option is not available on a continuous type system, master valves can only be installed on systems that control the watering side of the irrigation.

Master Valves

A master valve is used if the system has multiple pipes going for a single irrigation source to different crops. They physically separate the pipe lines for different stations (zones).

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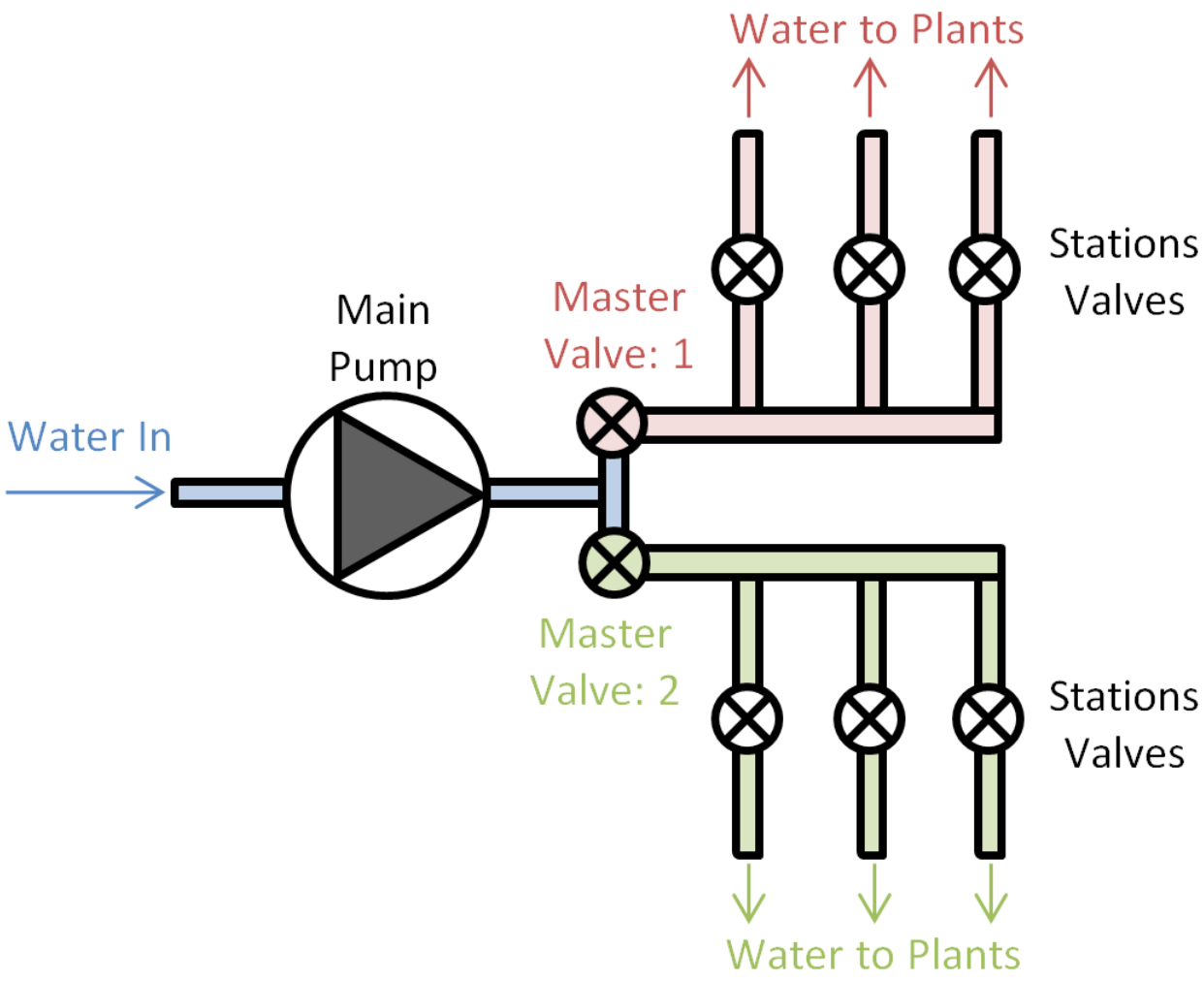
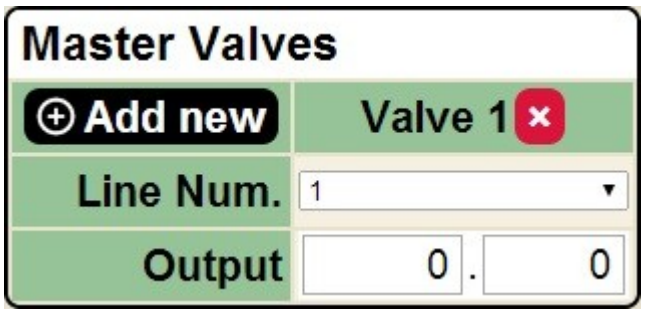


Adding a Master Valve

Pressing the add new button will add a new master valve into the irrigation system, once a new valve is installed it can be configured.



Line Num.: This is a logical line number associated with a certain master valve, this number is used when assigning Stations (zones) to a line.

Output: Address of the output expander this master valve is wired to, see section blah configuring a single output for more information.

Time Periods

Time periods for the system can be defined here, up to 5 time periods can be supported by each component within a manager. can be defined as a time of day, offset from sunrise or offset from sunset. The name of the time period is not important for control but very useful when configuring time period dependent variables. Whenever one of these variables is displayed in the system it will appear within a list of all configured time periods so is very important to make the names of each time period something to help identify. Useful names could be the times of day (7am-10am), solar events (Sunrise, Noon), specific time period purposes (Heat trap, RH purge), Times of the day name (Dawn, Morning) or any other useful identifier.

Name: Specify unique name for this time period.

Start Time: Specify the start time for this time period.

Configuring a Time of Day variable

A time of day variable are used through out the Multigrow system they are variables that will cause a specific event to happen at a specified time.

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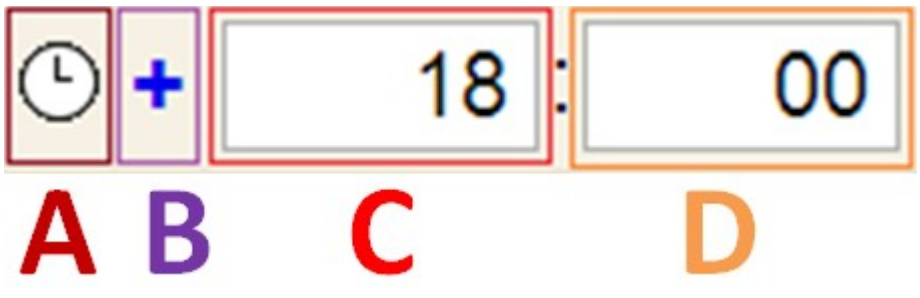
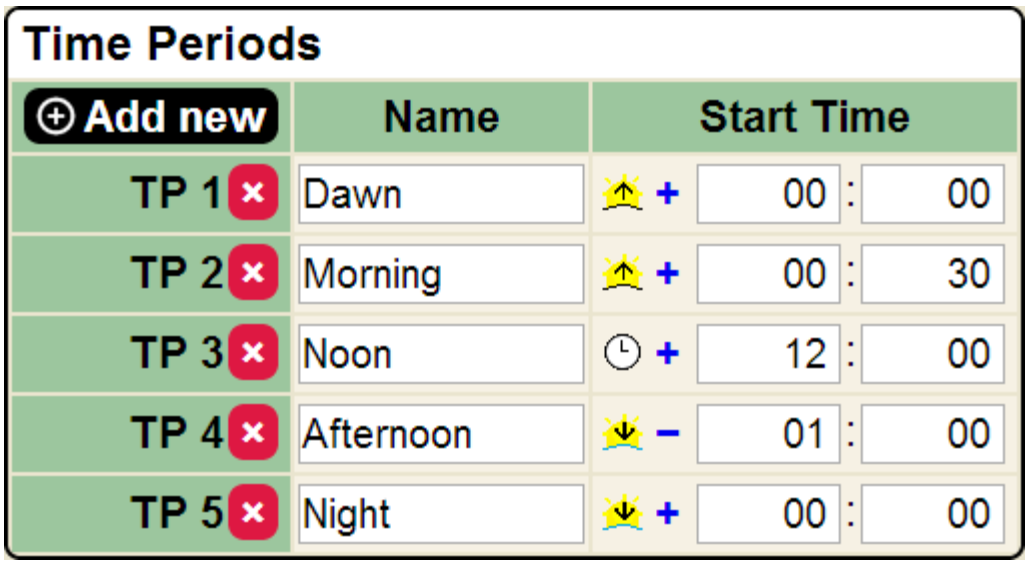


- **Setting A:** Specifies what the entered time is relevant to.
  - Selecting this icon means that the specified time is an offset from sun rise.
  - Selecting this icon means that the specified time is an offset from sun set.
  - Selecting this icon means that the specified time is a positvie offset from midnight, this is the same format as standard 24 hour time, 07 00 = 7 hour offset from midnight (7am), 19 00 = 19 hour offset from midnight (7pm).
- **Setting B:** States whether the offset being applied is positive or negative to the time specified. Note, when using a normal time this will be positively applied regardless of the setting.
  - The time specified is a positive offset from the first setting.
  - The time specified is a negative offset from the first setting.
- **Setting C:** The offset time hours are specified here.
- **Setting D:** The offset time minutes are specified here.

Using time periods



Each time period is active from the time specified within the box until the time of the next period. In the above configuration you can see a combination of various types of time periods.

If we take Sunrise to be 7:00am and Sunset to be 5:30pm, the time periods for the day work out to be;

Time Period	Name	Start	Stop
1	Dawn	7:00am	7:30am
2	Morning	7:30am	12:00pm
3	Noon	12:00pm	4:30pm
4	Afernoon	4:30pm	5:30pm
5	Night	5:30pm	7:00am

Settings

Time Periods

The first box visible on this page is used to configure the time periods of the system. These settings are identical to the one found on the configuration page, please refer the configuration section above for more information on this settings box.

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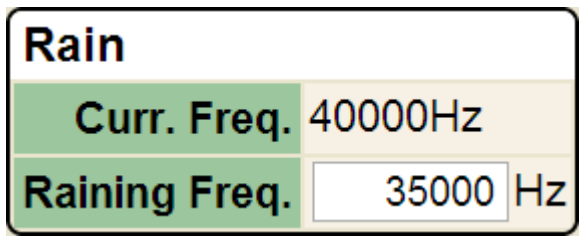
Rain

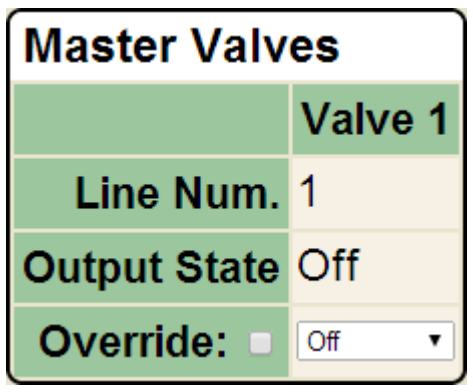


An irrigation system can use rain to reset certain triggers within a system, here the setting for this can be modified. Note a weather station is used to supply the status of the rain to the system and must be properly configured for this functionality to work correctly.

Curr. Freq.: Current frequency being measured by the weather station.

Raining Freq.: Frequency in which this particular irrigation system deems it to be raining.

Master Valves



Master valves have only one setting which can be found within this box they can only be overriden to a set level.

Line Num.: The line number assigned to the master valve.

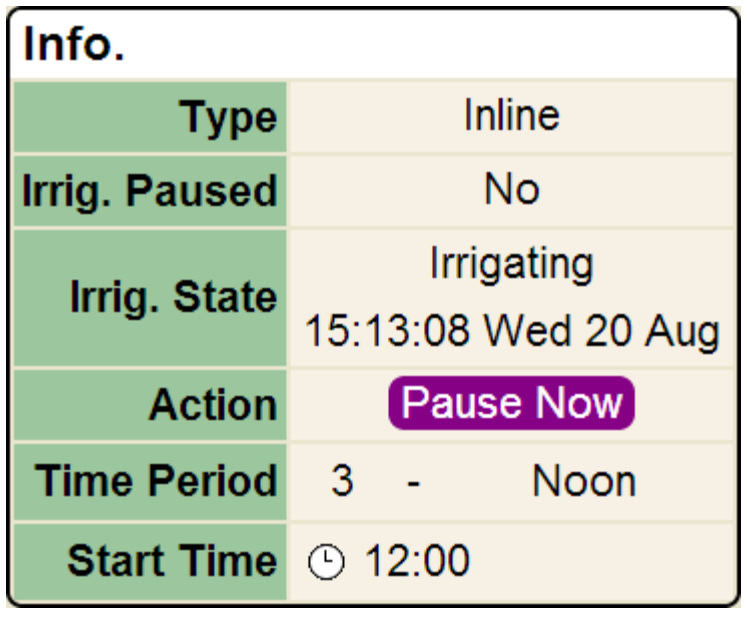
Output State: Current state of the master valve output.

Override: Ticking this box will software override the output to the state specified in the drop down box.

Readings

The Readings -> Status page for any irrigation system contains a quick snap shot of the systems current state. A small selection of important readings for each installed module will be displayed here.

Info.



Field	Description
Type	Configured type of irrigation system.
Irrig. Paused	Is the system currently paused.
Irrig. State	Current state of the irrigation system and what time it changed to it.
Action	User action buttons are displayed here, different buttons will be displayed depedning on the state of the system.

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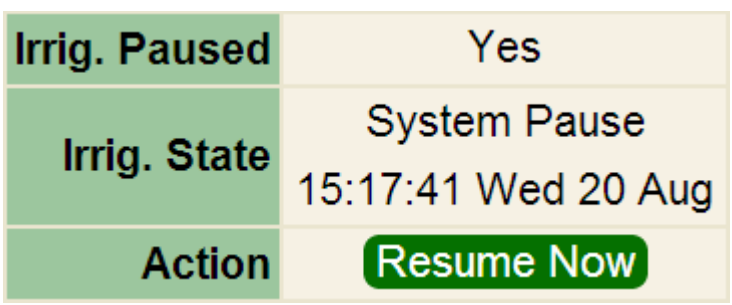
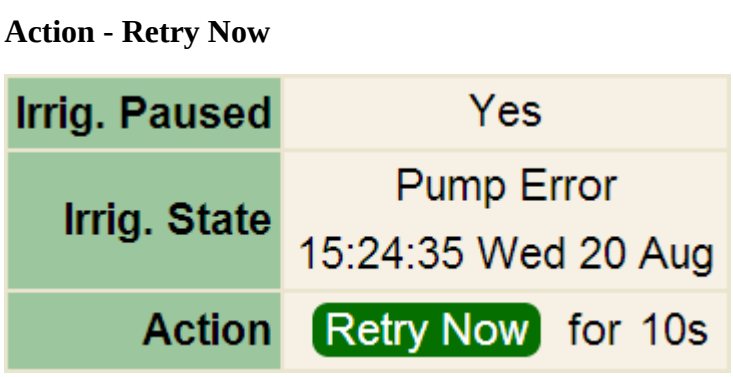
Field	Description
Time Period	The current active time period on the system, included the number of period and the name given to it.
Start Time	Start time of the current time period.

Action - Pause Now

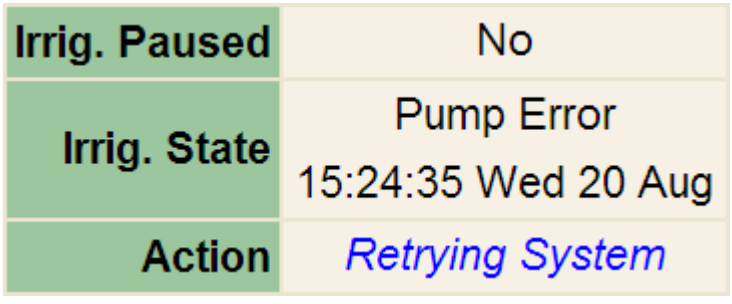


If the pause now is pressed while an Irrigating is active the whole system will be paused, when this happens the Action button will be changed to a Resume Now button and the Irrig. State will change to System Pause. When resumed the system will start up from where it was last in the irrigation cycle.

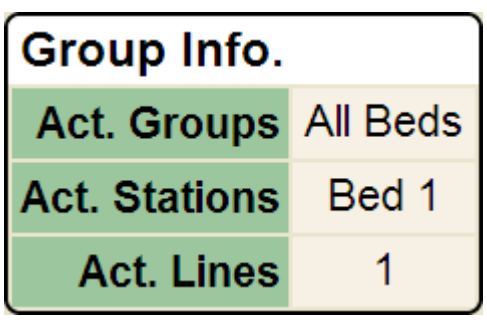
Action - Retry Now



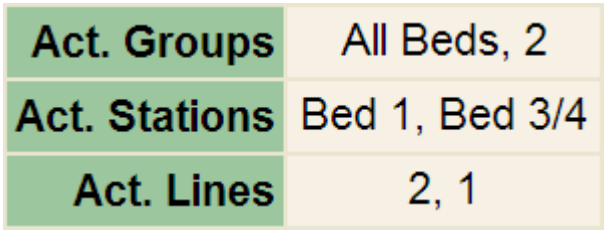
If an error occurs on the system that means it should stop running the current irrigation will be paused. However some error such as flow or pump need the system to actually try and run in order to check that the error has been resolved. When an error occurs a Retry Now button will appear along with a time to retry for. Pressing this button will resume the system momentarily but if the error is still present after the time specified the system will stop running again. The time the system will retry for is found on the Settings -> Water System page. When the retry now button is pressed the Action field will be updated to reflected this.



Group Info.



When a group becomes active the name giving to the group will appear in this box to indicate that it is running, if the group is unnamed the number of the group will appear. The stations that are active are also displayed in this box as well as the current main lines if installed.



If the system is configured to run multiple groups or stations these will be displayed here separated by a common.

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Act. Groups	All Beds
Act. Stations	Bed 1 (Paused)
Act. Lines	

If a system becomes paused the current active stations will be paused the groups are still deemed as active so they can be viewed here even though they are technically not active at present. Any active stations are append with the (Paused) label to indicated that are not running. Since no stations are active the active main lines will be turned of and disappear from the list.

Active Program

Active Program	
Name	Main Prog
Recipe	Day Mix

On an inline system the desired nutrient and pH levels of the day are always trying to be maintain, this means there is always an active program and recipe.

Field	Description
Name	The name of the currently active program, this is note that on a continuous system there is only one program so this will always be the same.
Recipe	The name of the current active recipe for this time period.

Readings

Readings		
Accum. Solar	21.4J/cm^2	
Capacity	100%	
Flow Rate	**Calc.**	100.00L/min
	Actual	62.37L/min
Accum. Vol	**Calc.**	92L
	Actual	968L

Field	Description
Accum. Solar	Accumulated solar from the systems solar sensor, this is reset at the end of day for the system.
Capacity	Current capacity the system is running out this is derived using the current calculated flow rate of the system and its maximum capacity.
Flow Rate	The current flow rate of the system if a flow meter is installed on the system both the calculated and actual flow rate will be displayed here. If the system does not have a flow meter the reading here will be the calculated flow only.
Accum. Vol	The current accumulated volume of the system if a flow meter is installed on the system both the calculated and actual volume will be displayed here. If the system does not have a flow meter the reading here will be the calculated accumulated volume. Both these reading will be reset at the systems end of day.

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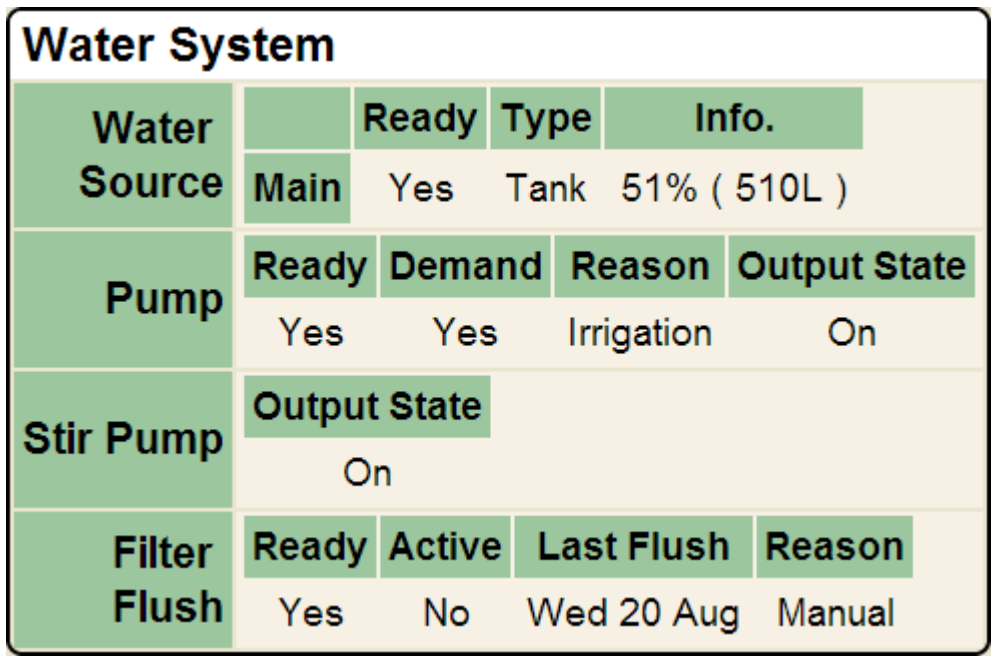
Water System



Depending on what modules have been installed on the system the information in this box will vary.

Water Source

The "Main" label that is shown in the above screen capture is actually the name given to this water source, this will vary depending on what the name of the source is set to. If no name is given this will appear as simple "Source".

Field	Description
Ready	Is the current configured water source ready. Note a town water supply is always ready.
Type	Type of water source configured.
Info.	If a water source has been configured as a Tank or Batch tank system the current fill level will be displayed here in both percentage and litres. Town water source does not have any relative information so is left blank.

Pump

If a pump has been installed on the system relevant information will be displayed here.

Field	Description
Ready	Is the pump ready to run.
Demand	Is their a demand for the pump to be on, if so the output should be on.
Reason	The reason why the pump is on. Note in a continuous system a main pump is always on unless an installed filter flush is happening. If the pump switch is in manual or the system cannot communicate to the pumps output module this will cause an Output Error on the system.
Output State	Current actually state of the output the pump is physically wired into.

Stir Pump

If a stir pump has been configured on the system the output state will be displayed underneath the water system box. The stir pump will active anytime the irrigation become active.

Filter Flush

If a filter flush module has been installed on the system the relevant information will be displayed here.

Field	Description
Ready	Is the filter flush ready, this means a flush is not currently active on the system.
Active	Is the system actively flushing the filter currently.
Last Flush	The date of the last completed flush.
Reason	The reason for the latest filter flush.

If a filter flush is currently active an additional field will appear with the time left until it is completed.

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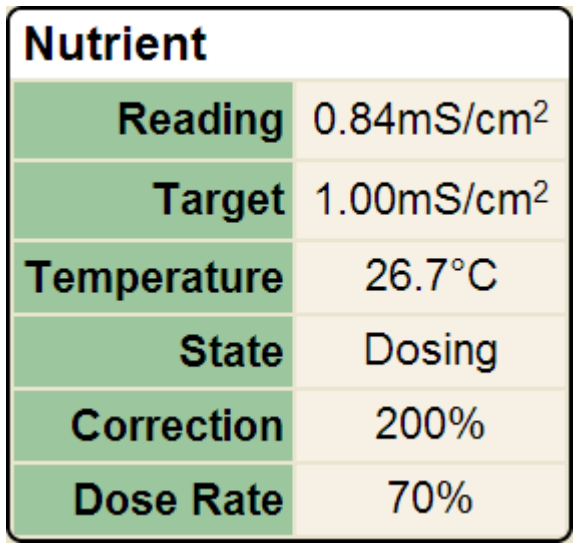
Time Left
1m 50s

Also if a filter flush is installed and becomes active the main pump for the system will be shut off unless the run pump setting for the flush has been configured.

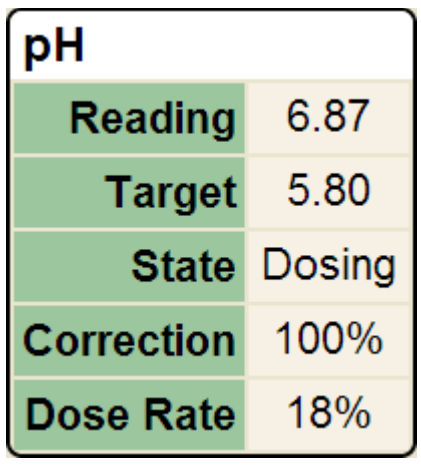
Nutrient



If the system has been configured to use nutrient dosing the current state of this module will be displayed here.

Field	Description
Reading	Current nutrient reading the system is using for dosing control, this is provided by the Measure EpM sensor group.
Target	Current target the system is trying to achieve, this value come from each groups program within the system. Since it is feed from a active group if no groups are currently irrigating the reading will be reported as an XX this is not an error in this instance.
Temperature.	Current temperature of the water the probe is in, this is also provided by the Measure EpM sensor group.
State	Current state of the nutrient dosing module.
Correction	Current correction factor being used in the nutrient dose rate algorithm.
Dose Rate	Current dose rate the nutrient outputs are running at.

pH



If the system has been configured to use pH dosing the current state of this module will be displayed here.

Field	Description
Reading	Current pH reading the system is using for dosing control, this is provided by the Measure EpM sensor group.
Target	Current target the system is trying to achieve, this value come from each groups program within the system. Since it is feed from a active group if no groups are currently irrigating the reading will be reported as an XX this is not an error in this instance.
State	Current state of the pH dosing module.
Correction	Current correction factor being used in the pH dose rate algorithm.
Dose Rate	Current dose rate the pH outputs are running at.

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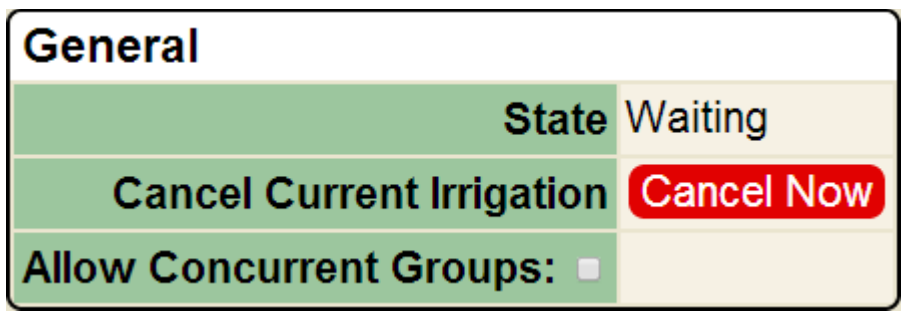
Groups

A group is a logical collect of stations (Zones) within an irrigation system. These maybe similar plants (Tomatoes, Flowers) Perhaps a where things are physically located (Compartment 1, Outside Crop) or collection of drippers (Bed 1, Bed 2). Each group can have various triggers source such as solar, time of day,. A group can also be manual triggered. In system such as Inline and Batch a Program and Recipe can be assigned to each groups so watering of different groups can have varying Nutrient and pH targets as well as differing recipe mixes.

Example here:

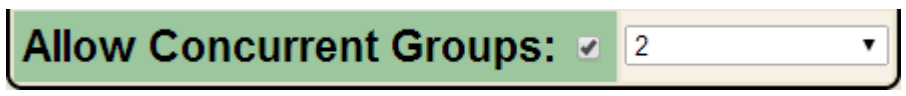
Settings

General



State: Current state of the irrigation system

Cancel Current Irrigation: Pressing the cancel now button will immediately cacncel all current active irrigation's. Note that pending irrigation's may start after this.

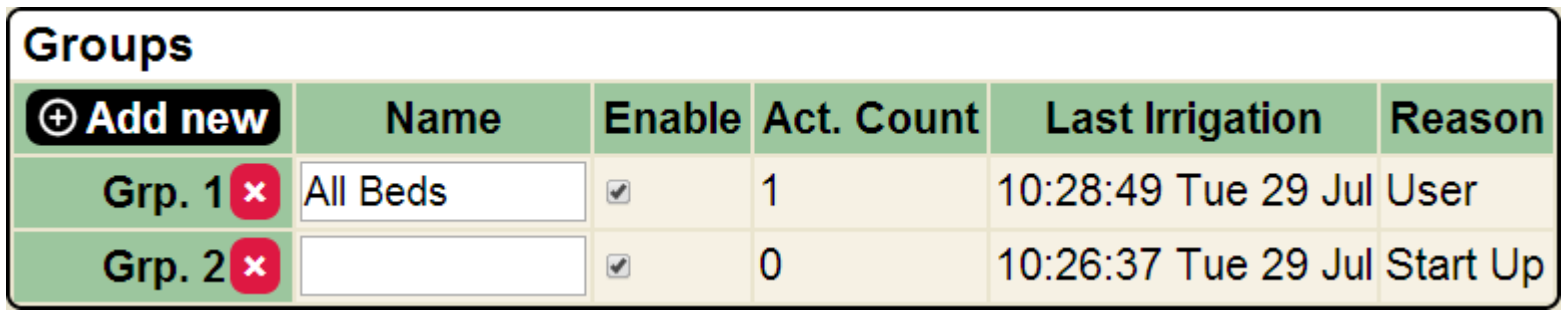


Allow Concurrent Groups: This setting allows more than one group to operate simultaneously on the system. This should only be used if an adequately sized pump has been installed. In the case of inline injection or batch dosing using this setting will mean all groups must run using the same program and recipe as all water is passed through the same dosing system. Ticking the box will reveal a drop down box where the number of groups can be specified. This number is a maximum number of groups that can be on at the same time.

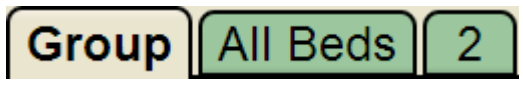
Enable Post Fill Dosing: This option is only available on a batch system, this will enable the batch tank to dose while doing a post fill. This will however restrict the system to a single program and recipe, which will be used for post fill dosing as well as normal dosing when a group is triggered.

Groups

Groups can be added to the system by the use of the add new button in the groups box on the group tab.



Name: A unique name should be given to each group in order to better identify it within the system this name has no effect on the control. Once a group is added and name it will appear along the tab menu for groups under the name given. Note if the name field is left empty it will be identified using the number of the group.



Enable: This box must be ticked if this group is going to be active. A group might have various triggers configured and needs to be disabled unticking this box will stop the group from running without having to disable the trigger set up on the group.

Act. Count: How many times the group has been active today, this variable is reset at the end of day time.

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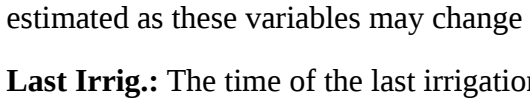
Last Irrigation: The last time the group was irrigated. Note if the controller is reset all groups will have the same time until triggered. Also if a new group is added the time will be set to the time it was activated.

Reason: The reason why the last irrigation happened, this is the trigger cause of the group. Even if the group is cancelled right away this will still be updated. Note that if the system is reset all groups will have start up as the reason. If a group has start up as the reason it has not run since the last time the controller was power cycled. This is also the default reason used when a group is created.

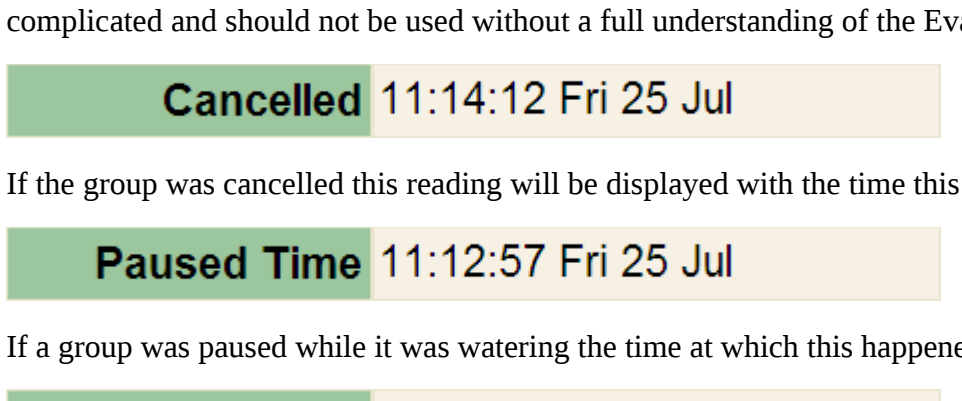
Group



By navigating to the name of the group on the groups tab menu each groups individual settings can be accessed.

Stations

The stations tab is where individual stations can be added to the group a manual action button are also located here as well as general information about the group.



The Info. box contains all relevant information about the group and it's last irrigation.

Active: This variable is used to indicate if this group is currently being water by the system.

Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

Last Irrig.: The time of the last irrigation trigger for the group and the reason it happened.

Finished: The time the group finished it last watering.

Additional Information

Depending on how the irrigation went or configured triggers the information box can contain additional fields.

If the group has been configured to use pETo triggers the current volume of this will be displayed in the Info. box. Note that pETo triggers are complicated and should not be used without a full understanding of the Evapotranspration model.

If the group was cancelled this reading will be displayed with the time this occurred, since a cancel is a user only event no reason will be given for this.

If a group was paused while it was watering the time at which this happened will be displayed in the Info. box.

When the group was unpaused the time at which this happened will be displayed in the Info. box.

If the group is configured to have periodic triggers the reading which drive these are reset whenever a group is triggered. The reset source can be because the group was irrigated or manual reset. The time at which this happened will be displayed as well as the reason.

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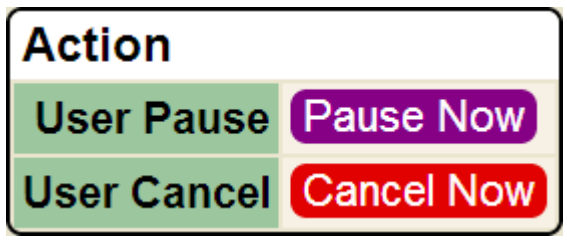
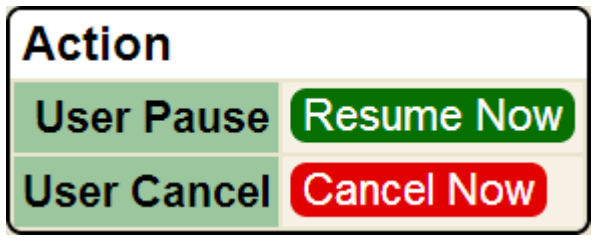
Action

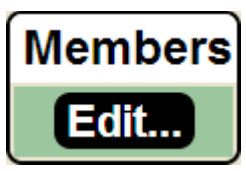
The action box is a quick way to trigger an irrigation on a group from the stations page. Pressing the Irrigate now button will cause an immediate trigger. Note depending on how the system is configured and what may already be running the group may not actually start irrigating straight away, a trigger will however be queued for this group.

Once triggered the action box will change to enable you to either pause/resume a group or cancel this group.

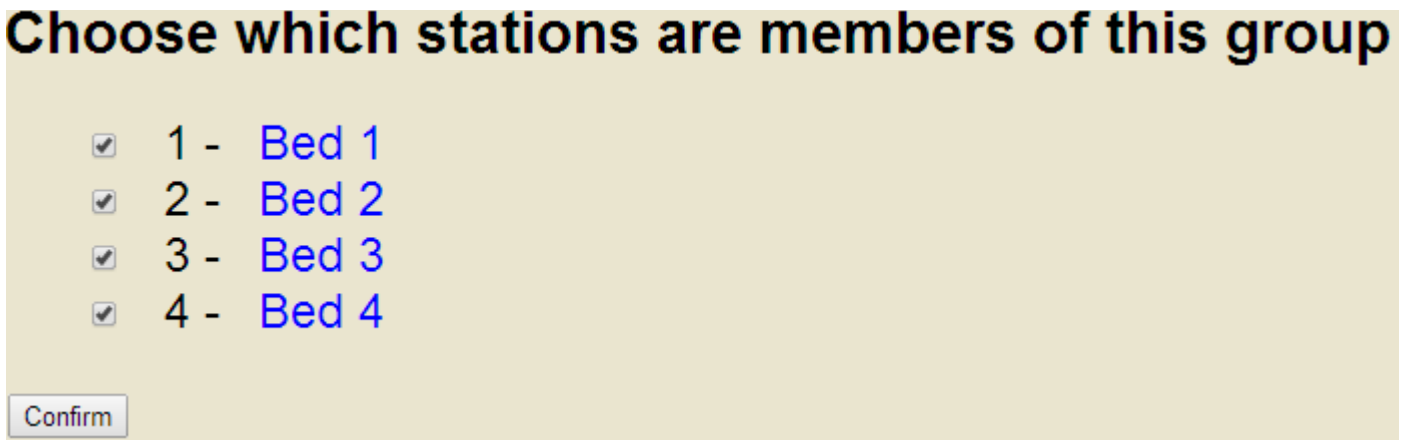




Members

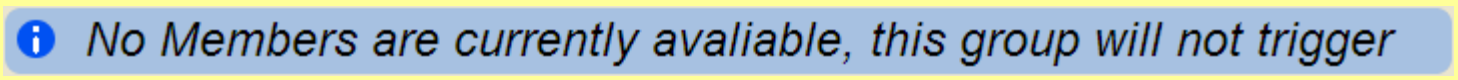


Each group can have up to X amount of members configured. A member is a station (zone) assigned to a group. Pressing the Edit.. button will bring up the members selection page.



Here placing a tick box beside the desired station will add it to this group. The blue field is the name that has been given to the station underneath the configuration page if this is blank the number represents the number of the station. Once all members have been selected press the confirm button to return to the previous page.

If there are no members configured on a group it will not trigger, the follow message will be displayed if this is the case.



Once members have been added to the group and activative this error message will disappear.

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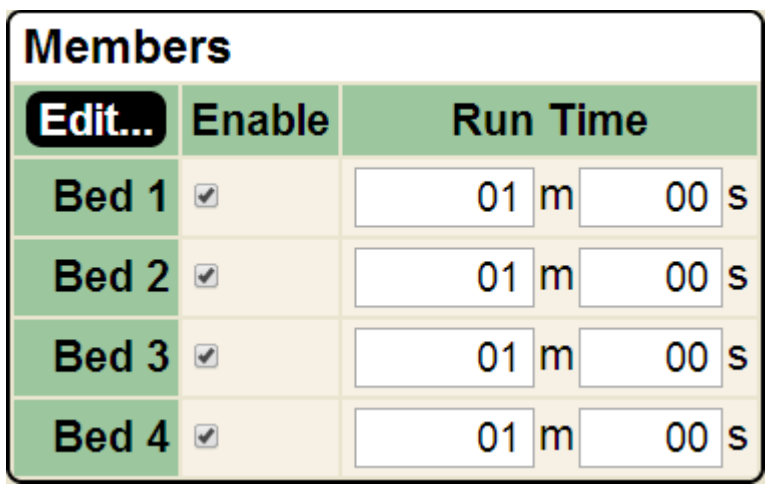
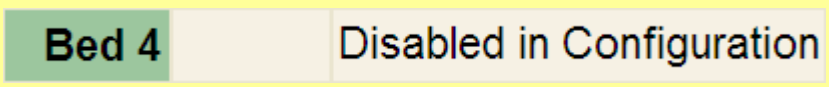


Enable: Though a stations is added to a group it may need to be disabled for a period of time. Unticking the enable box will stop this group being watered when this group is triggered.

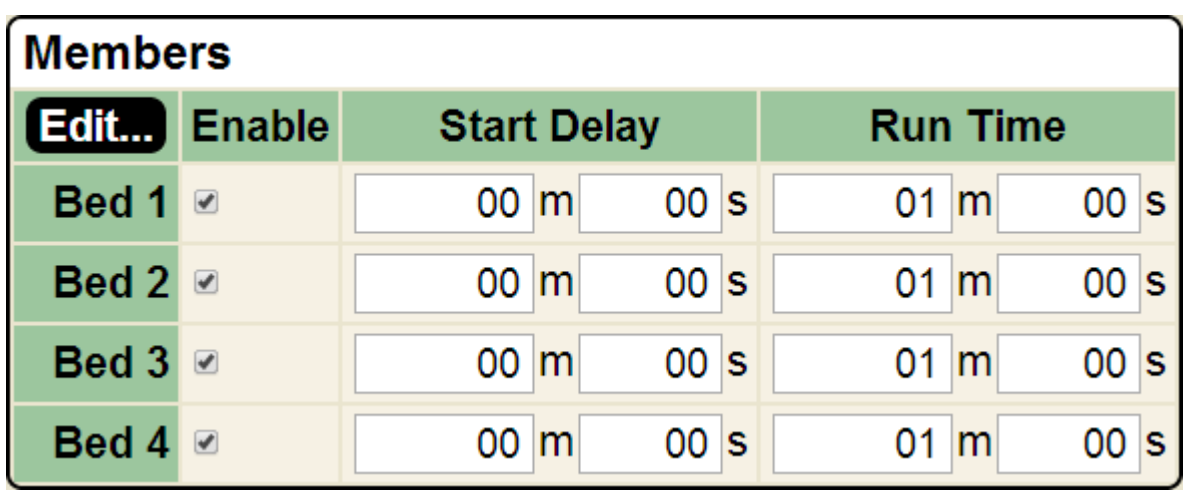
Run Time: The time the stations will be watered for this is set per member per group so each stations run time can be varied simply by the run time specified in the member.

If a station is not enabled under the station configuration page, it cannot be run under any group. It can still be selected as a member but the following box will be displayed.



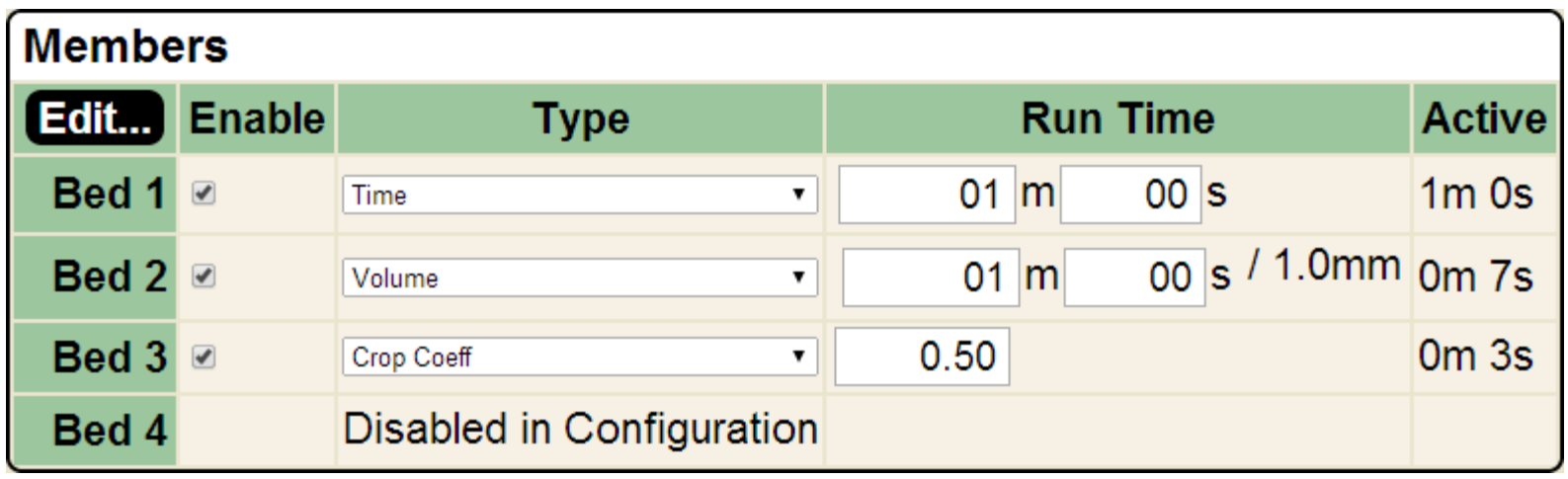
The stations must be enabled in order to water this station.

Start Delayed Groups



If group has been setup to ignore the capacity check under the Group->Settings tab then each station will run regardless of if the system capacity is exceeded. This can cause problems if the pump isn't big enough to handle this so a start delay can be used to offset stations to ensure that stations that will run together that will exceed capacity. Note start delays only make sense if multiple stations are being run at once or concurrent groups are running simultaneously.

pETo Run Times



If a group is set up as a pETo group the run time for each station can be varied based on how much volume of ETo the group has measured.

Enable: The enable setting remains that same as a normal.

Type: Here the type of run time can be specified for each member of the group.

- **Time:** This is a straight forward time and will always run at the station for this length.

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- **Volume:** This will modify the stations run time based of the current pETo volume.
- **Crop Coeff:** The run time will be modified based on the pETo run time specified for the station under the configuration.

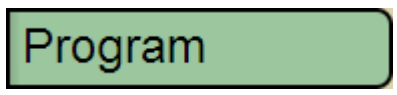
Run Time:

- *Time:* If the Type is configured as a time the run time setting is a simple time.
- *Volume:* The Run Time will be modified based of the current pETo volume being measured. In the example the current run time will be 1 Minute for every 1.0mm volume measured.
- *Crop Coeff:* The crop Coefficient type means that as the crop changes the run time needs to be modified. The pETo run time is consistent so is configured as a stations based setting on the configuration page and the members modify the effect of this. If the stations pETo run time is configured as 1 Minute per 1.0mm and the Crop Coefficient as 0.50 then at actual effective pETo effect is 1 Minute per 2.0mm

If a Coefficeint type run time is going to be used the pETo Stations enable setting on the configuration page must be enabled if this is not the station will be given a run time of 0m00s and this error message will be displayed.

Active: Current run time the station will be assigned if triggered.

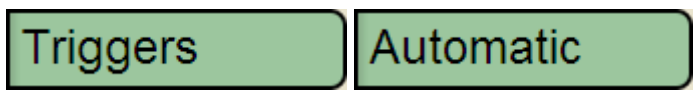
Program



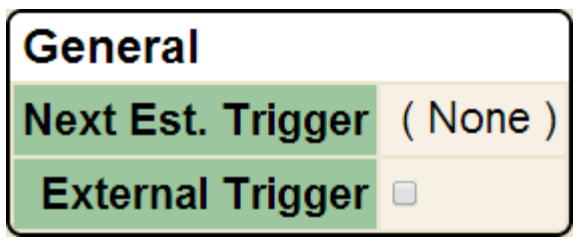
Programs can be individually assigned to each group within an Inline or Batching system, depending on how a system is configured. If the system is an inline system and is set up for concurrent groups a single program is given for the system rather than per group as this doesn't make sense if multiple groups can run simultaneously. This is similar to the post fill dosing option for a batch system where the tank will already be pre-batched with a certain program and recipe so all groups must use the same one. For information about how to configure a program please see the section on Programs later on in the manual.

Triggers / Automatic

The trigger tab will appear as Automatic if the group is configured as manual. Here is where all none periodic triggers are configured.



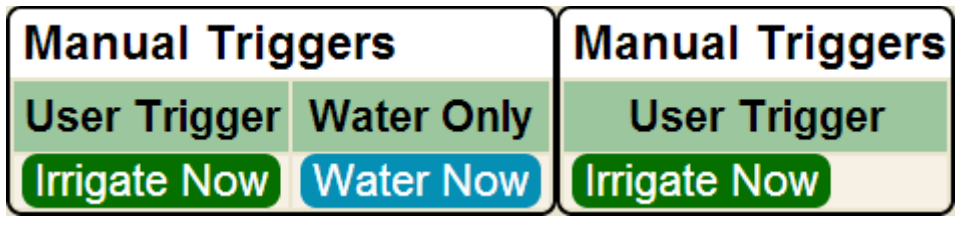
General



Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

External Trigger: An external trigger is a contact closure input wired into an Remote EpM module under the CC input pin or the Moist input on connector B. When this input is pulled the appropriate level by the use of a contact an irrigation is triggered. This can be used with the wall mounted button for example.

Manual Triggers



The action box is a quick way to trigger an irrigation for a group. Pressing the Irrigate now button will cause an immediate trigger. Note depending on how the system is configured and what may already be running the group may not actually start irrigating straight away, a trigger will however be queued for this group. A inline or batching system also has the ability for a water only trigger, pressing the Water Now button has the same effect as a

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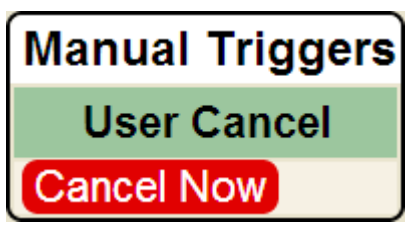
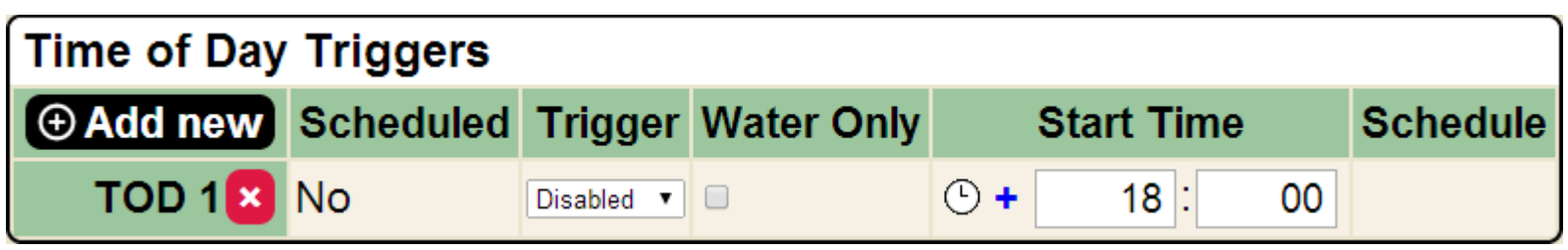
the Irrigate Now except the dosing will be disabled for this group. If the system is a watering system the Irrigate Now button and the Water Now button will result in the same effect so only the Irrigate Now button is viable on this type of system.



Once triggered the action box will change to enable you to either pause/resume a group or cancel this group.

Time of Day Triggers (TOD's)



A Time of day trigger sometimes referred to as TOD is an automatic triggers that will happen at the same time everyday. This will depending on other settings such as days of the week enables and if the trigger is scheduled. Each group can have up to 8 Time of Day triggers.

Scheduled: Is this Time of Day currently scheduled. Note Automatic triggers are always scheduled unless the day of the week is disabled under settings.

Trigger: What kind of trigger this time of day uses.

- ***Disabled:*** Time of day trigger is currently disabled.
- ***Auto:*** Time of day trigger will happen everyday that is allowed to trigger on.
- ***Manual:*** The time of day trigger will only be trigger once then will need to be re-scheduled in order to trigger again.

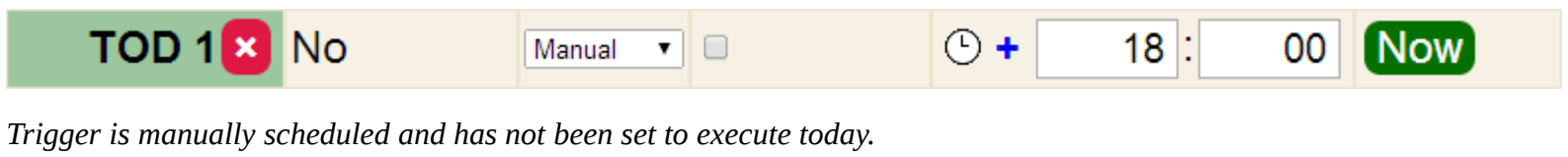
Water Only: The Time of Day trigger will trigger a water only irrigation for the group.

Start Time: The time at which this particular trigger will start at.

Schedule: If a manual Time of day trigger is being used a Now button or Cancel button will appear in this box.

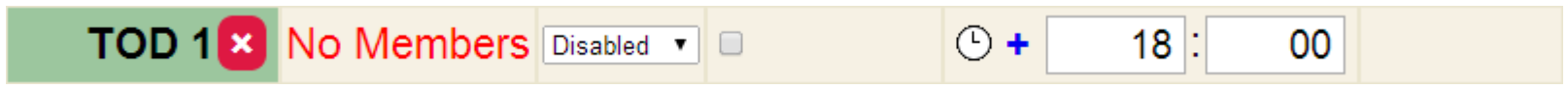
Trigger is automatically scheduled and will be executed as 6pm today.

Trigger is automatically scheduled but will not run today at 6pm because the group is not allowed to trigger today this is shown by the (DOW) next to the No.



Trigger is manually scheduled and has not been set to execute today.

Trigger is manually scheduled and has been set to execute today at 6pm.



The current group does not have any members assigned to it, this means it is unable to trigger and will not execute this trigger.

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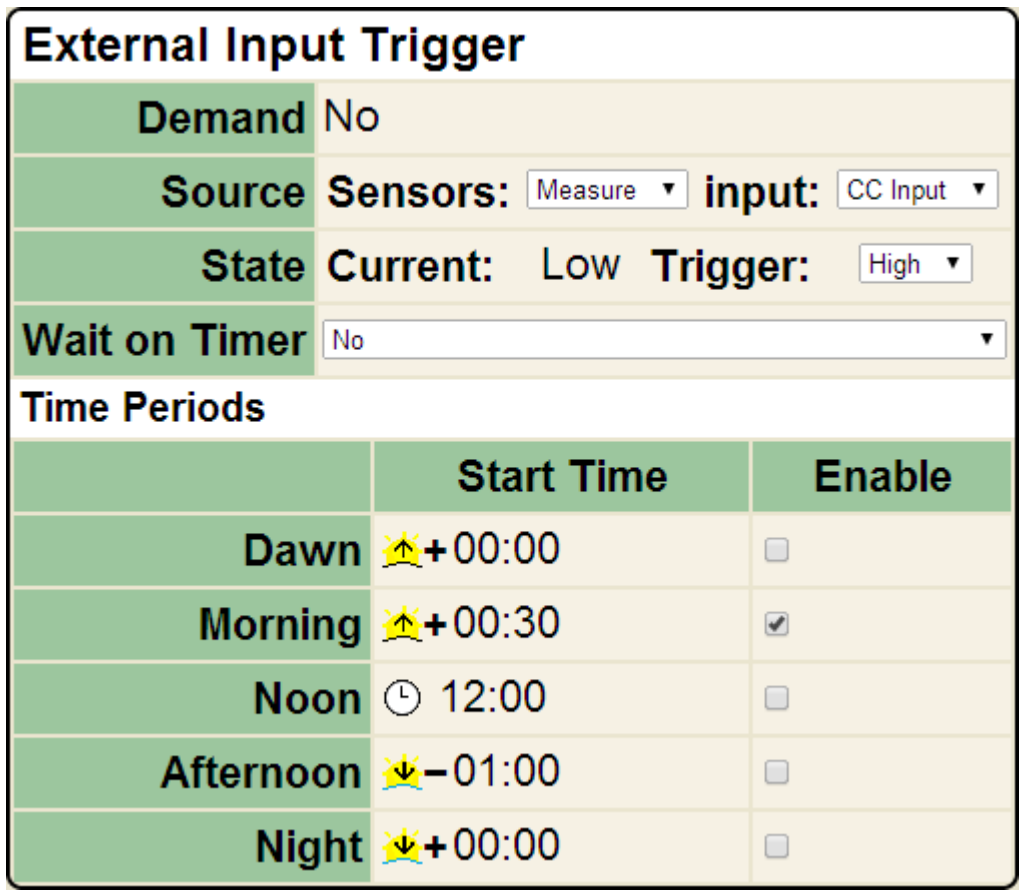
External Input Trigger



Demand: Is an external input trigger demand, once this trigger has been processed this demand will be cleared however the group may not of started irrigating yet. If the trigger is not enabled during this time period the system will

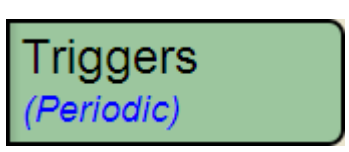
Source: Defines exactly where the input is coming from, this trigger can be activated from any of the three local system sensors. And can be from either the CC input pun or Analog input pin of the device. Note that the appropriate Use Me var must be configured under the sensor setting for the group to ensure that the system

State: List the current state of output as well as the level needed to on the input to action this trigger.

Wait on Timer: If a periodic minimum time out is being used under the group periodic triggers the external input trigger can be configured to obey this. Setting this field to yes means and external trigger cannot be processed until the minimum time out has been reached.

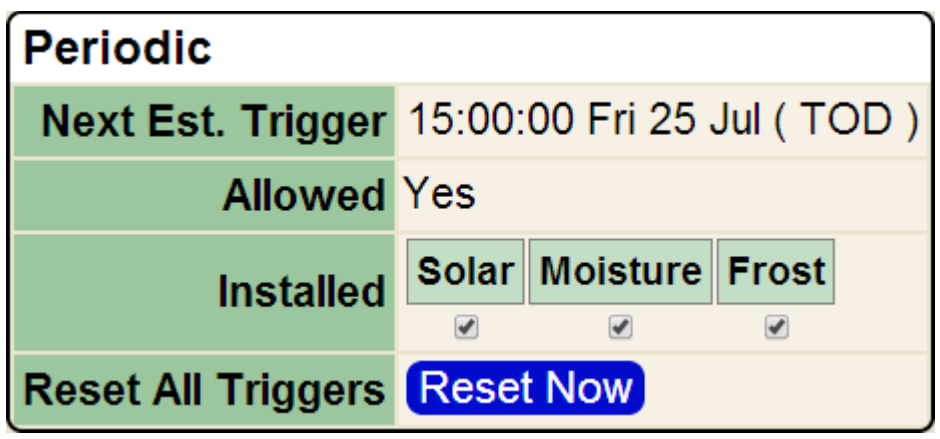
Enable: The trigger can be enabled to only allow triggers within certain time periods.

Periodic Triggers



Each group can have periodic triggers enabled under the settings tab, when this is set an additional tab will be displayed in order to configure them. A periodic trigger is something that is deemed to happen multiple times a day, a certain temperature has been reached, a certain amount of solar has been received.

Periodic


Periodic
Next Est. Trigger 15:00:00 Fri 25 Jul (TOD)
Allowed Yes
Installed Solar Moisture Frost
Reset All Triggers Reset Now

Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

Allowed: Is a periodic trigger allowed, this is controlled by the Minimum timer function of the periodic triggers if this is disabled or the time has

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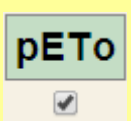
expired this reading will say Yes, otherwise the time remaining will be displayed.

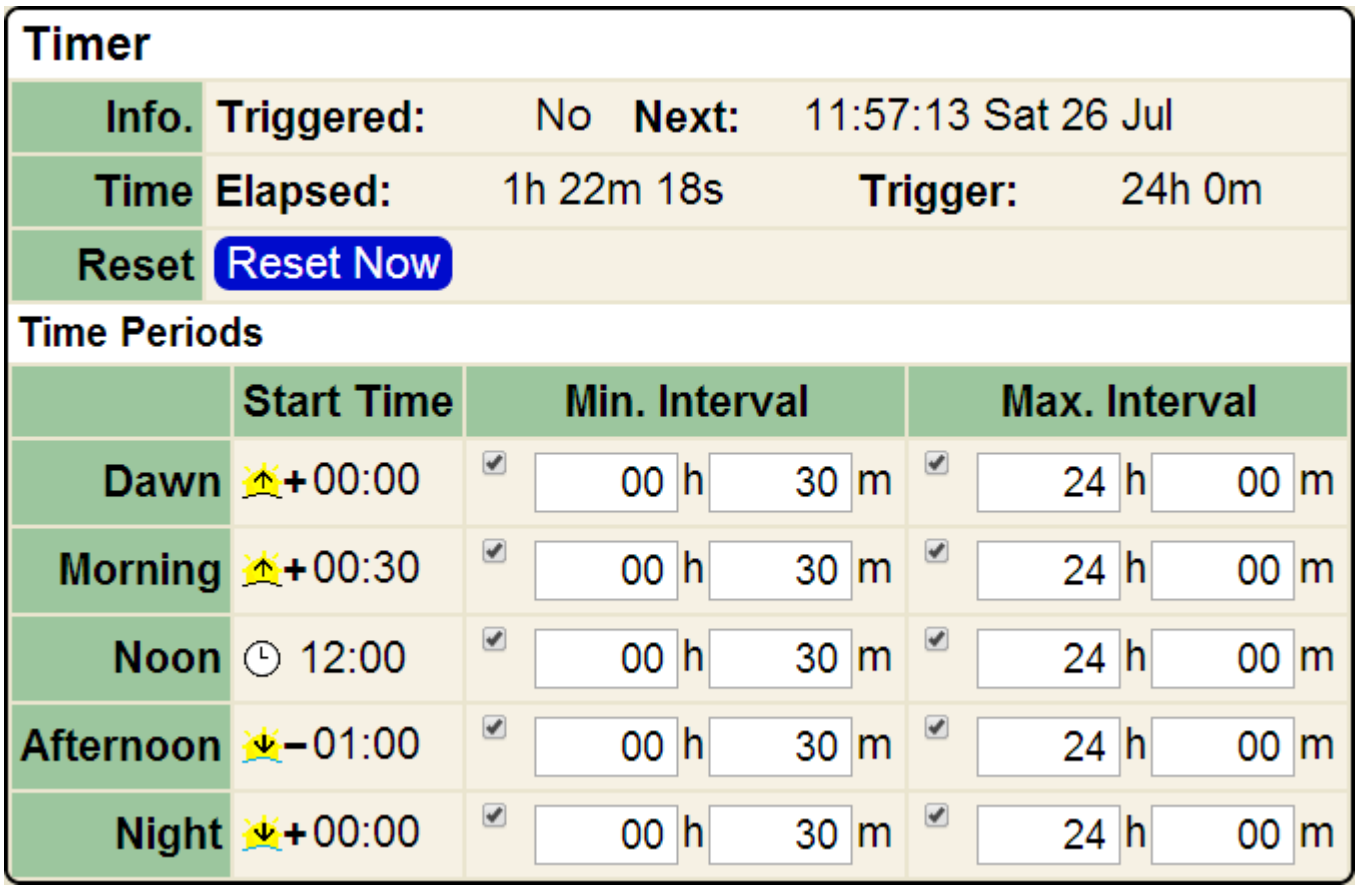
Installed: The Multigrow system supports up to 3 different periodic trigger sources with the option of adding a four if configured in a certain way. Ticking and activating these boxes will reveal separate settings boxes in which each of these can be configured.

A additional periodic trigger can be installed in the system if a pETo group is being used. The additional box shown below will be displayed if this option is available.



Reset All Triggers: Pressing the reset now button will make it seem like a trigger has occurred to the periodic counters installed on the system. This can be useful when delaying but not completely stopping periodic triggers.

Timer


Timer
Info. Triggered: No Next: 11:57:13 Sat 26 Jul
Time Elapsed: 1h 22m 18s Trigger: 24h 0m
Reset Reset Now
Time Periods
Start Time
Min. Interval
Max. Interval
Dawn +00:00 00 h 30 m 24 h 00 m
Morning +00:30 00 h 30 m 24 h 00 m
Noon 12:00 00 h 30 m 24 h 00 m
Afternoon −01:00 00 h 30 m 24 h 00 m
Night +00:00 00 h 30 m 24 h 00 m

The periodic timer lets you specify a minimum time between irrigation as well as a maximum time for each group in the system. Note that if a minimum time is set all other periodic triggers are held off by this. Time of Days and manual triggers ignore this setting.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the Max interval is disabled there will be no next trigger predicted.

Time: Current time that has elapsed since the last trigger for the group. This will be since any trigger not a just a time trigger. Trigger time for the timer, if a max interval timer is disable for the time period this will be left blank.

Reset: Pressing the reset now button will clear the elapsed time back to zero, this will cause the periodic triggers to wait the minimum time again as well as push back the max time out trigger. This is to hold off periodic triggers.

Min. Interval: Each time period has it's own minimum time out settings for greater control. Ticking the Min. Interval tick box will reveal a time box field where the hour and minutes of the minimum interval can be set. Once the elapsed time exceeds this value periodic triggers are allowed to execute.

Max. Interval: Each time period has it's own maximum time out settings for greater control. Ticking the Max. Interval tick box will reveal a time box field where the hour and minutes of the maximum interval can be set. Once the elapsed time exceeds this value a Time Out trigger will be executed.

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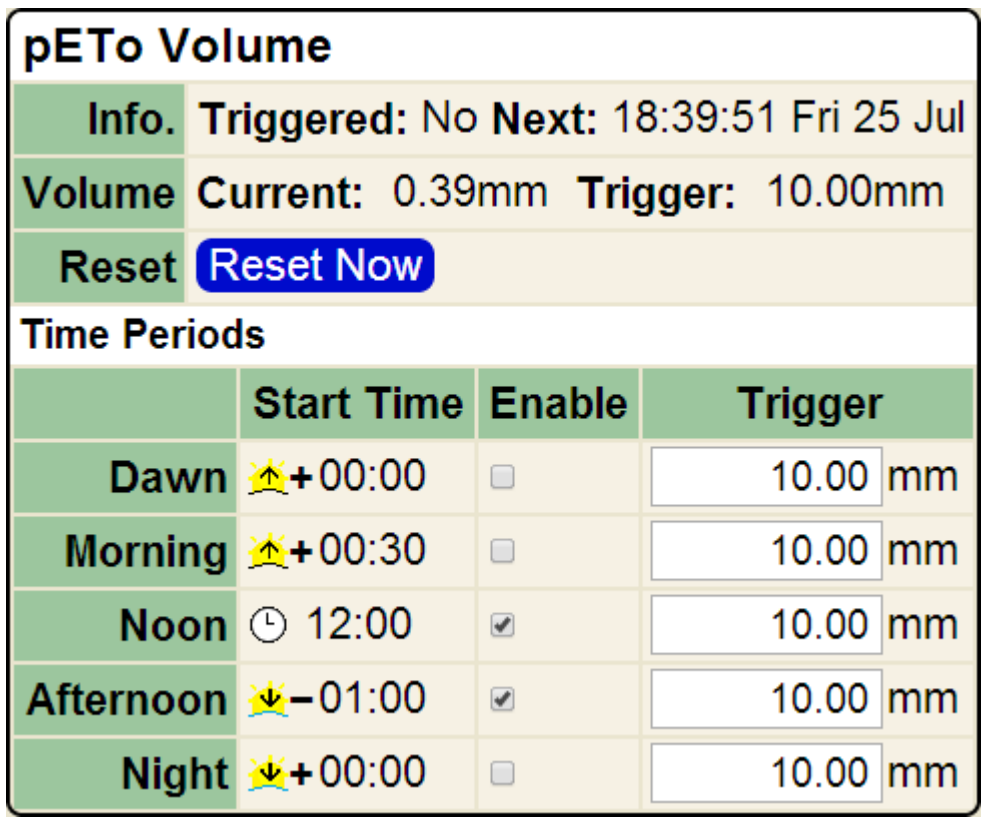
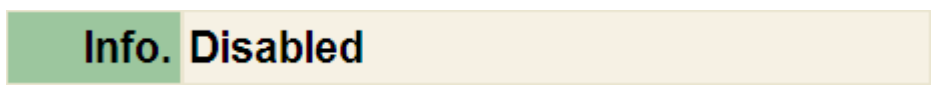
pETo Volume



If a group is configured to use pETo Volume the trigger can be configured here. Each group within the system can have a different pETo trigger. The pETo volume accumulator needs to be properly configured in order for this trigger to work, please refer to the pETo configuration section below for more information on this.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.



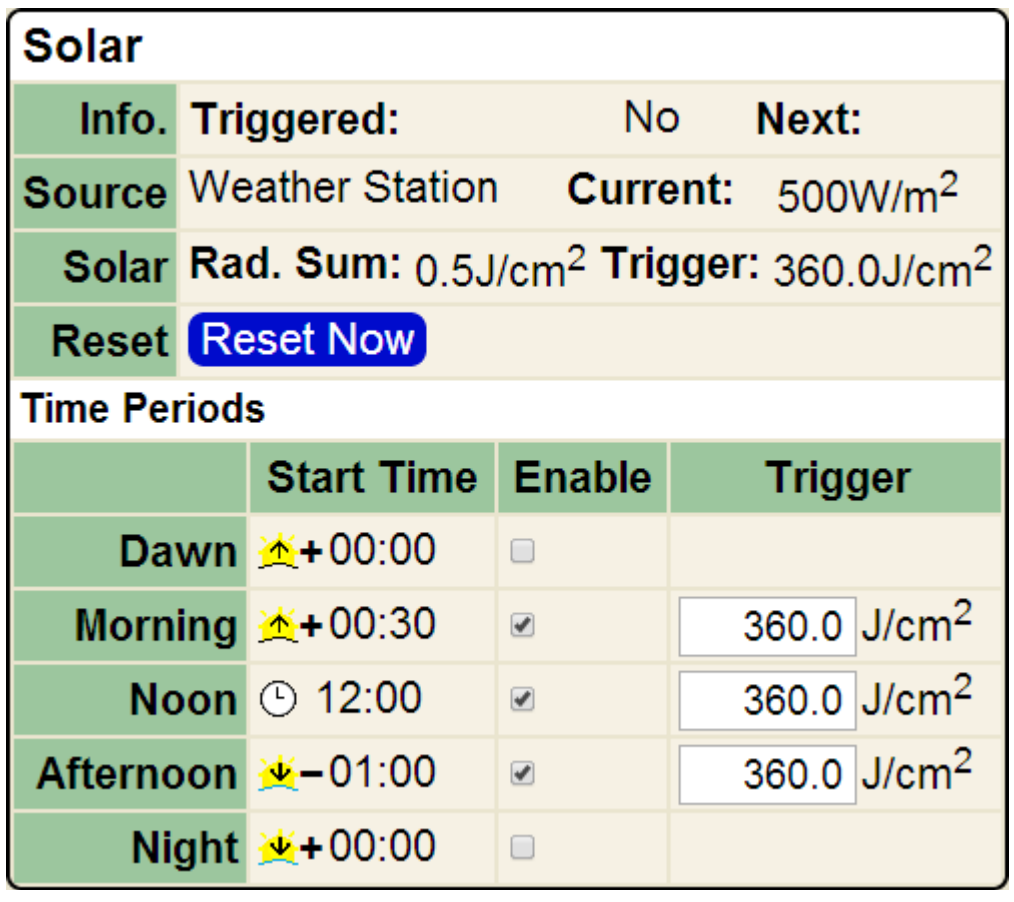
Volume: The current accumulated volume being measured by the group and the current trigger level are displayed here. If the trigger is not enabled the this time period the trigger value will be empty.

Reset: Pressing the reset now button will clear the accumulated volume back to zero.

Enable: Enable a pETo accumulated volume trigger for this time period.

Trigger: Desired trigger level for the time period. Note this value is not visible until the enable is saved.

Solar



A solar trigger lets you specify a accumulated solar level in which the group will be irrigated at, for each group in the system. Note that if a minimum time is set all this triggers will be held off until this time elapses. A valid solar source also needs to be available and configured for the group for this

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trigger to be used. Note the default value for this trigger is 360J/cm^2 this is the average amount of solar radiation accumulated over 1 hour of direct sunlight, during the middle of the day in summer for New Zealand. During winter this number is usually about a third of this 120J/cm^2, or a trigger time of 3 hours instead of 1.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

Source: Current source configured on the group this is set under the settings tab for each group. The current solar radiation value of this source will also be shown here.

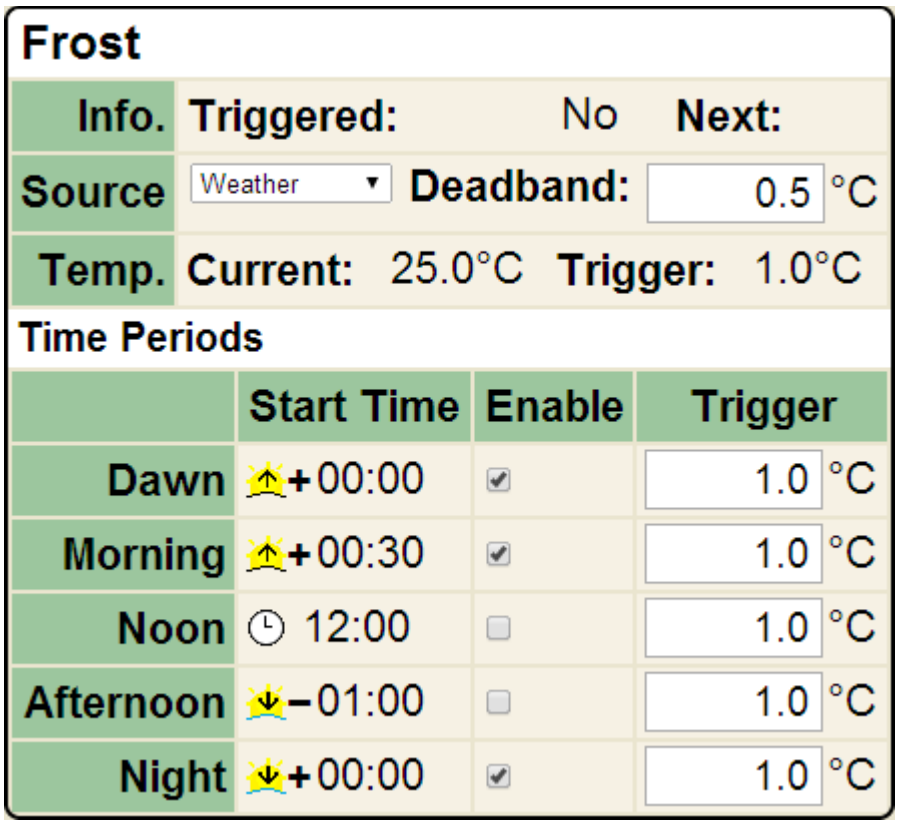
Solar: Current accumulated solar for the group since the last irrigation trigger. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Reset: Pressing the reset now button will clear the accumulated solar back to zero.

Enable: Enable a periodic solar trigger for this time period.

Trigger: Desired trigger level for the time period. Note this value is not visible until the enable is saved.

Frost



During cold times of the year it is possible to configure a group to have a temperature based trigger in order to protect crops from frost. A valid temperature source needs to properly configured for this trigger to operate correctly. It is important to note that while the temperature is below the trigger point an irrigation will be constantly request for this group and will not clear until the temperature rises above the trigger level plus the deadband offset. Because of this it is recommended to use the Min. Interval timer in conjunction with the frost triggers, to insure an appropriate time between irrigation occurs.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

Source: The temperature source this trigger uses as well as the deadband level for the clearing of the trigger.

- ***Weather:*** The frost trigger uses the temperature provided by the weather station.
- ***Independent:*** The frost trigger will use an independent temperature sensor as its source.

Note: If a independent sensor is being used when this option is selected and saved an address box will become visible. The address of the sensor must be entered here. The first box is used to specify the rotary switch address of the device and the second is used to specify whether to use Temperature Probe 1 or 2 (T0 or T1) connected to the device.

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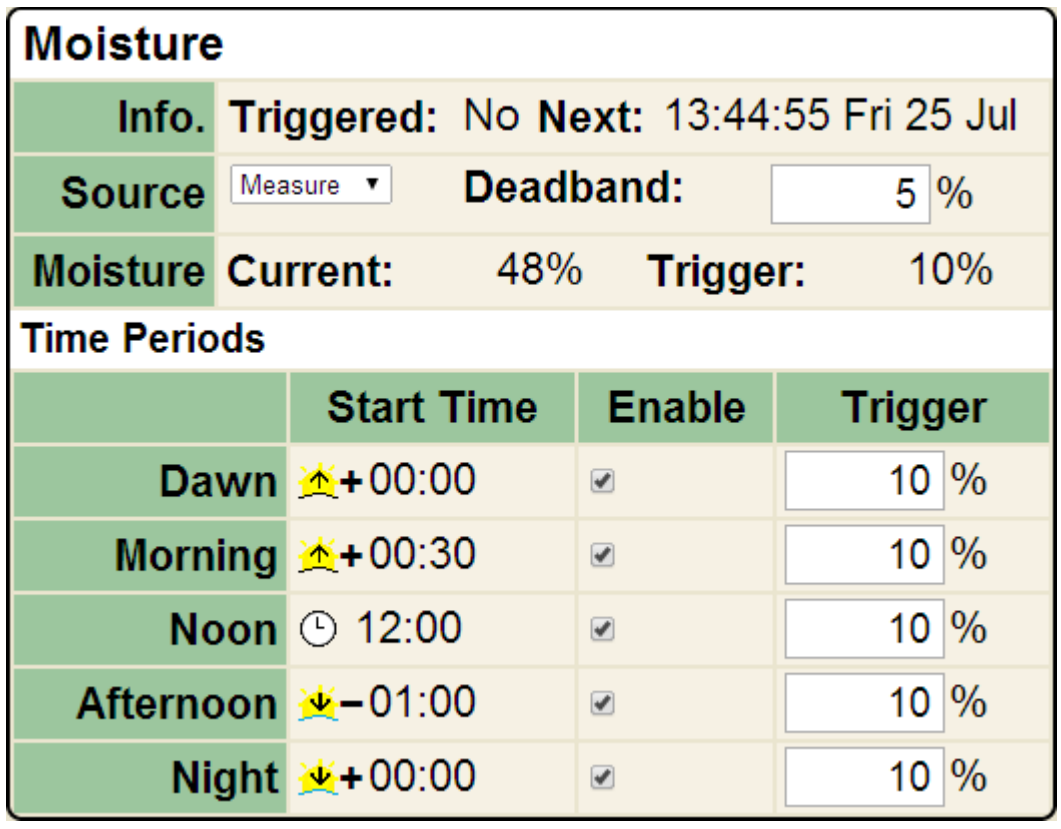
Temp.: Current temperature of the specified source. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Enable: Enable a periodic frost trigger for this time period.

Trigger: Desired trigger level for the time period. This is the minimum temperature before a trigger occurs, the temperature source must drop below this for a trigger to occur. Note this value is not visible until the enable is saved.

Moisture



It is possible to configure a group to trigger based on a moisture level reading from a specific device. A valid moisture source needs to properly configured for this trigger to operate correctly. It is important to note that while the moisture is below the trigger point an irrigation will be constantly request for this group and will not clear until the moisture level rises above the trigger level plus the deadband offset. Because of this it is recommended to use the Min. Interval timer in conjunction with the frost triggers, to insure an appropriate time between irrigation occurs.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

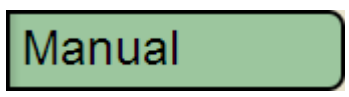
Source: Defines exactly where the moisture input is coming from, this trigger can be activated from any of the three local system sensors. The deadband level for the clearing of the trigger is also set here.

Moisture: Current moisture level of the specified source. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Enable: Enable a periodic moisture trigger for this time period.

Trigger: Desired trigger level for the time period. This is the minimum temperature before a trigger occurs, the temperature source must drop below this for a trigger to occur. Note this value is not visible until the enable is saved.

Manual



It is possible to configure a group to have a manual watering plan. Enabled this option under the settings tab will reveal the manual tab. Here the members of a group can be reorder, missed or individually water. This is useful when dealing with crops with irregular watering cycle, or greater control over individual stations within the system.

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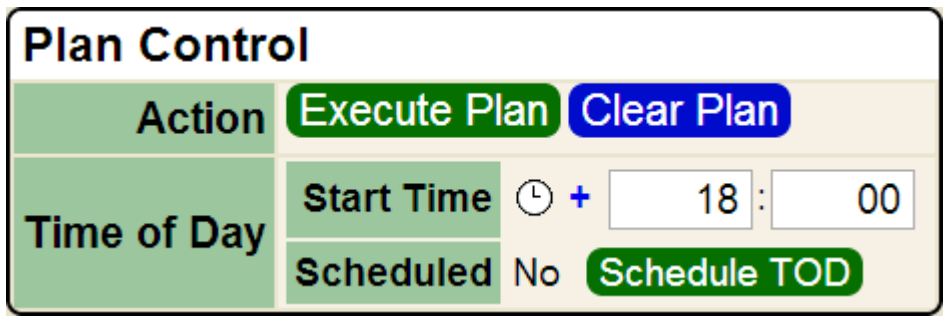
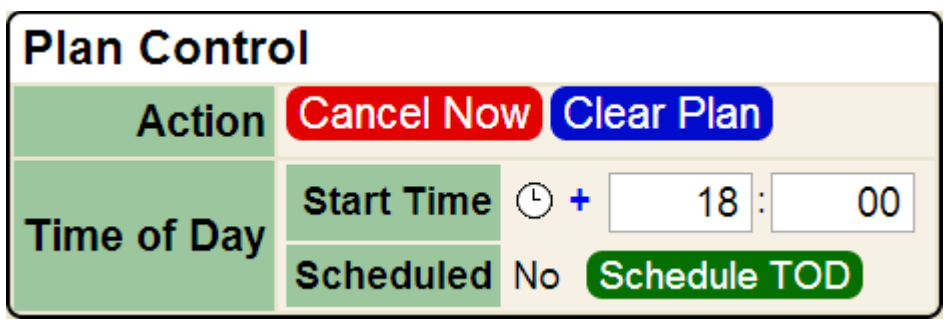
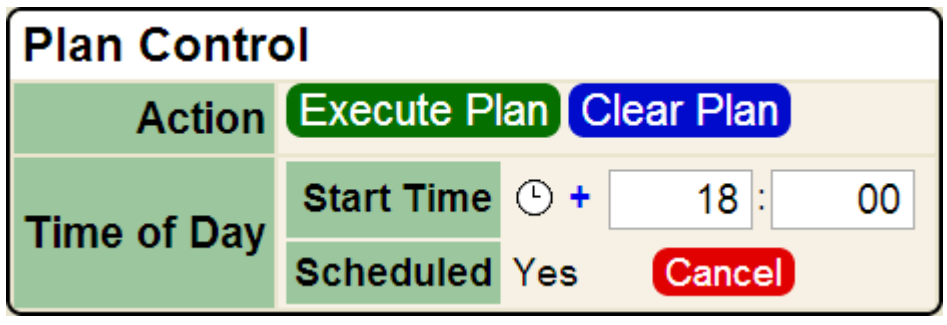
Plan Control

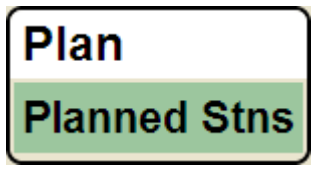


A watering sequence that is manually created is called a Plan, in this box a created plan can be Executed, Cancelled or Cleared. A plan can also be scheduled to run at a certain time of day. This time of day trigger works the same as the manual time of day triggers under the Automatic tab. It will queue a single time of day trigger once this is processed it will then need to be re-scheduled to trigger again (it will not happen automatically). Note that this manually schedule time of day will ignore any days of the week setting than might be configured on the group.

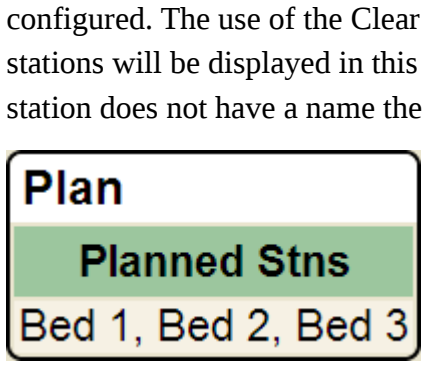




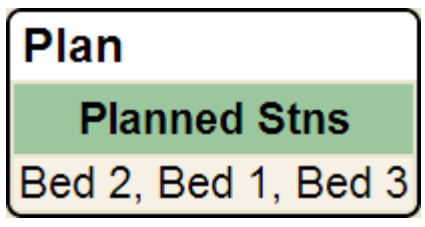
Plan



This holds the current watering plan for the members of the group, once the plan has been watered it will not reset it will stay how is was last configured. The use of the Clear Plan button in the Plan Control settings box must be used to clear the currently configure plan. The name of the stations will be displayed in this list and the order of how they will be watered members can be added out of order from the normal watering plan. If a station does not have a name the station number will be displayed instead.

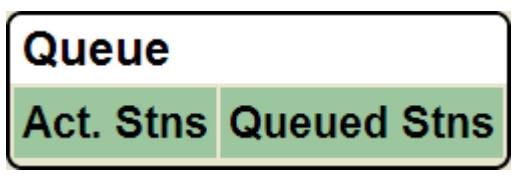


This plan will water Bed 1, Bed 2 then Bed 3.



This plan will water Bed 2 first; then Bed 1, then 3.

Queue



A queue is the current state of the plan being executed. Stations that are active will be shown under the Act. Stns box and stations waiting to be

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executed under the Queued Stns box. If a stations is manually executed while a plan is running it will be added to the end of the Queue.

For example if we are executing the first Plan above.

Queue

Act. Stns	Queued Stns
Bed 1	Bed 2, Bed 3

Bed 1 is currently active with Beds 2 & 3 waiting, after Beds 1 & 2 have run we decide to run Bed 4 manually this will add the stations to the end of the Queue

Queue

Act. Stns	Queued Stns
Bed 3	Bed 4

Members

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Add	Now	Waiting
2	Bed 2	01 m 00 s	Add	Now	Waiting
3	Bed 3	01 m 00 s	Add	Now	Waiting
4	Bed 4				Disabled

Members operate similarly to the stations page, however members cannot be added or removed here. A manual plan can only exist of members already assigned to the group. Here stations can be added/removed from a plan or triggered manual. The state of the station is also shown here. If a station is disabled under the configuration page it will also be **Disabled** here unable actioned.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Now	Planned
3	Bed 3	01 m 00 s	Remove	Now	Planned
4	Bed 4				Disabled

When a member is added to the plan the field will be updated here you can see the plan button has changed from Plan to Remove pressing this button now will take the member out of the current plan. The State has also changed from **Waiting** to **Planned** indicating this member is in the plan.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Cancel	Running
2	Bed 2	01 m 00 s	Remove	Cancel	Queued
3	Bed 3	01 m 00 s	Remove	Cancel	Queued
4	Bed 4				Disabled

When a manual plan is executed the field are updated again. Since the member is already planned for watering it is unable to be individually triggered anymore. However pressing the Cancel button will remove the stations from the queue or stop it from running if it is currently active. Pressing the

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Cancel button will not remove it from the plan, similarly pressing the remove button will only take it the member out of the Plan it will not remove it from the Queue. The state here has changed from **Planned** to **Queued** or to **Running** if the station is active.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Cancel	Running
3	Bed 3	01 m 00 s	Remove	Cancel	Queued
4	Bed 4	01 m 00 s	Add	Now	Waiting

After a stations in the plan has completed it will return back to it's **Planned** state if in the plan or **Waiting** if it was manually triggered.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Now	Planned
3	Bed 3	01 m 00 s	Remove	Cancel	Running
4	Bed 4	01 m 00 s	Add	Cancel	Queued

If a station is not in the plan but manually trigger it will be added to the queue.

pETo Volume

pETo Vol.

pETo Vol. is reading derived from four major environmental readings in order to estimate an approximate Evapotranspiration volume (ETo) for a crop. The Evapotranspiration is a combination of both the evaporation and transpiration of the area it can be useful in determine exactly how much water the plant has lost. The pETo Volume uses accumulated solar, wind speed and vapor pressure deficit (VPD) to estimate the positive volume of the ETo and rainfall to negatively offset it. The option for using pETo Volume is found under the settings tab for a group and must be ticked and applied before this tab is visible.

General

General

Total pETo Volume	0.17mm
Effects	Solar: + 0.14mm Wind: + 0.03mm VPD: + 0.00mm Rain: - 0.00mm
Last Irrigation	11:23:08 Fri 25 Jul
Reset	Reset Now

Total pETo Volume: Total volume measured since the last irrigation. This is the volume that is used to drive pETo triggers under the periodic trigger section of the group.

Effects: A quick overview of the effects each individual reading is currently having on the total volume.

Last Irrigation: Time of the last irrigation for the group.

Reset: Pressing the Reset Now button will clear the pETo volume to 0.00mm

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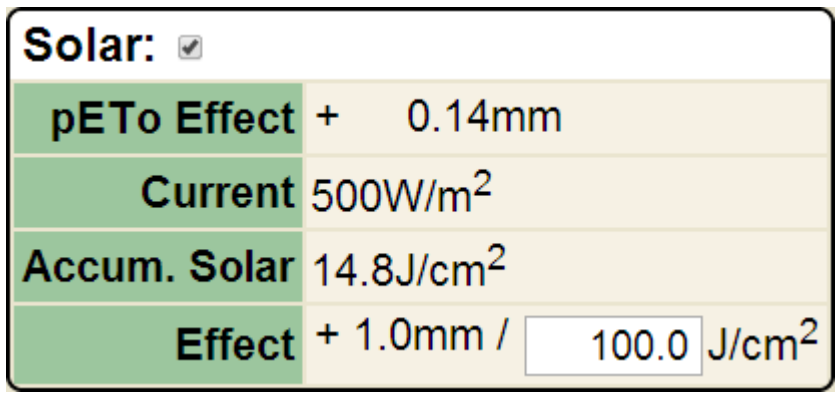
Solar



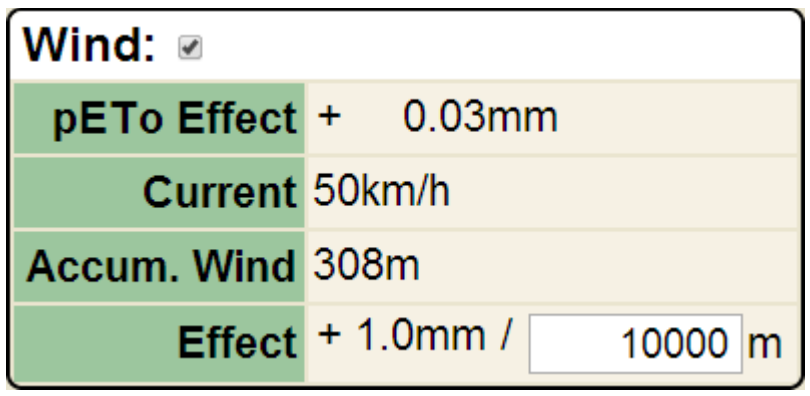
pETo Effect: In order for the solar to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated solar will have.

Current: The current solar being measured. This value is feed from the group solar configured on the settings page.

Accum. Solar: The current accumulated solar radiation since the last irrigation.

Effect: How the accumulated solar will affect the pETo volume. This value is proportional so will be calculated even if the current accumulated volume has not been reached. As you can see above the accumulated radiation is 14.8J/cm^2 with the current setting of 1.00mm / 100.0J/cm^2 this equates to 0.14mm.

Wind



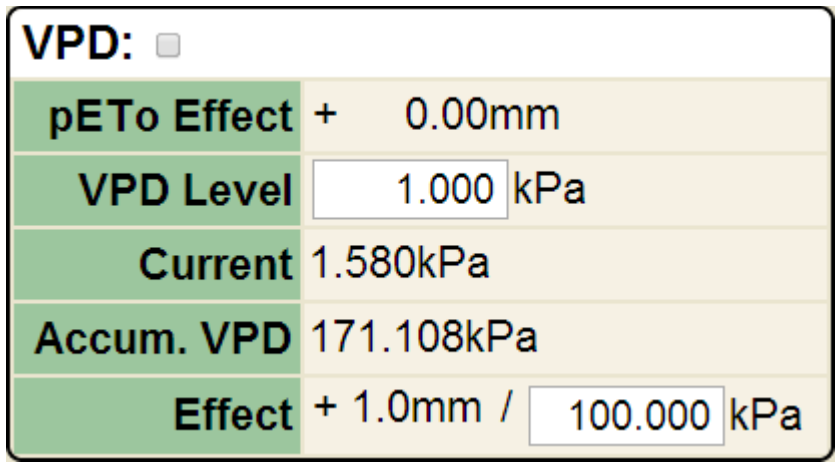
pETo Effect: In order for the wind to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated wind will have.

Current: The current wind being measured. This value is feed from the weather stations and this must be properly configured in order for this to work.

Accum. Wind: The current accumulated wind since the last irrigation.

Effect: How the accumulated wind will affect the pETo volume. This value is proportional so will be calculated even if the current accumulated volume has not been reached. As you can see above the accumulated wind is 308m with the current setting of 1.00mm / 100000m this equates to 0.03mm.

Vapor Pressure Deficit (VPD)



pETo Effect: In order for the VPD to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated VPD will have.

VPD Level: Since the VPD is a constant reading it is only necessary to accumulate it once it has reached a significant level. As the it rises the air can carry more vapor which aids evaporation. Once the VPD reaches the level set here it will being to accumulate in order to give a better representation of how

Current: The current VPD being measured. This value is feed from the weather stations and this must be properly configured in order for this to work.

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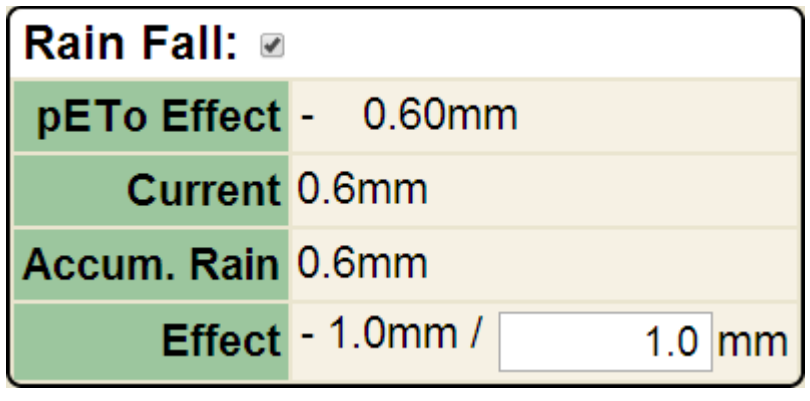
Accum. VPD: The current accumulated VPD since the last irrigation that has been above the set VPD Level.

Effect: How the accumulated VPD will affect the pETo volume.

Rain Fall



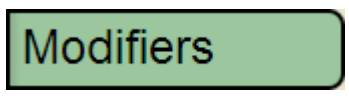
pETo Effect: In order for the rain to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated rain will have.

Current: The current rain fall since midnight. This value is feed from the weather stations and this must be properly configured in order for this to work.

Accum. Rain: The current accumulated rain fall since the last irrigation. Note that the Current is reset at midnight whereas the Accum. Rain is reset on irrigation so it is possible for these values to differ.

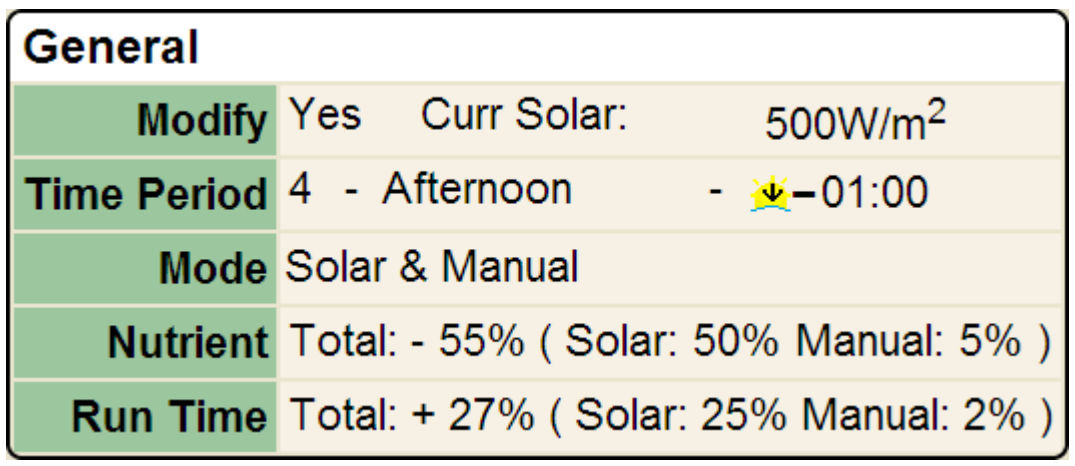
Effect: How the accumulated rain will affect the pETo volume.

Modifiers



Modifiers can be installed in a group to modify the stations run times or nutrient targets if applicable. This option must be enabled on the settings tabs for the group in order to make this tab visible.

General


General
Modify Yes Curr Solar: 500W/m2
Time Period 4 - Afternoon - 01:00
Mode Solar & Manual
Nutrient Total: - 55% (Solar: 50% Manual: 5%)
Run Time Total: + 27% (Solar: 25% Manual: 2%)

Modify: Are modifiers currently needs and the what is the current solar reading this decision is based on.

Time Period: Current active time period, the number, name and start time are listed in this field.

Mode: Current modifier mode configured for this time period.

Nutrient: Total current nutrient modifier and break down of each component. Note if the group is installed on a system with out dosing this modifier will be hidden.

Run Time: Total current stations run time modifier and break down of component.

> Example: If we are trying to irrigate the following group;
> **Group:** Beds 1 & 2
> **Target:** 1.00mS/cm^2
> **Members:**
> * Bed 1 Run Time: 1m00s
> * Bed 2 Run Time: 2m30s
>
> With the current modifiers listed above the resulting settings will be;

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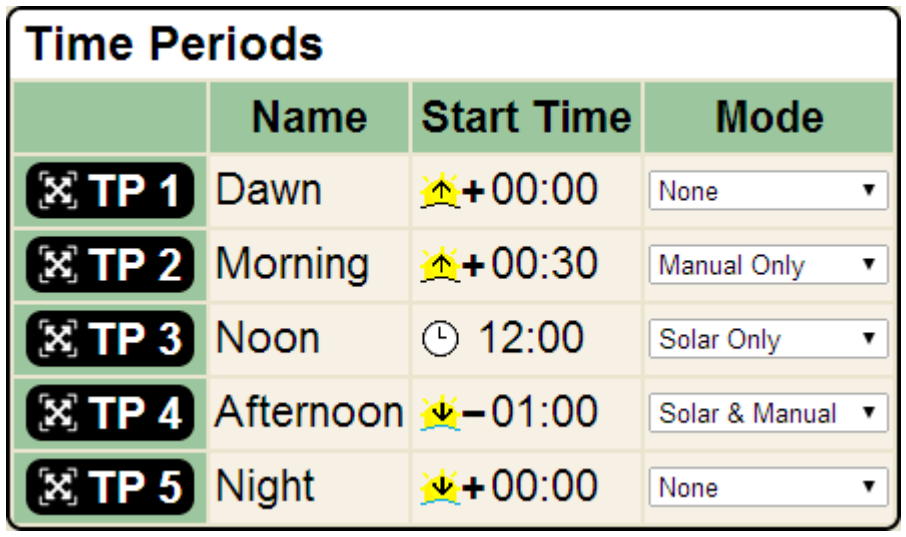
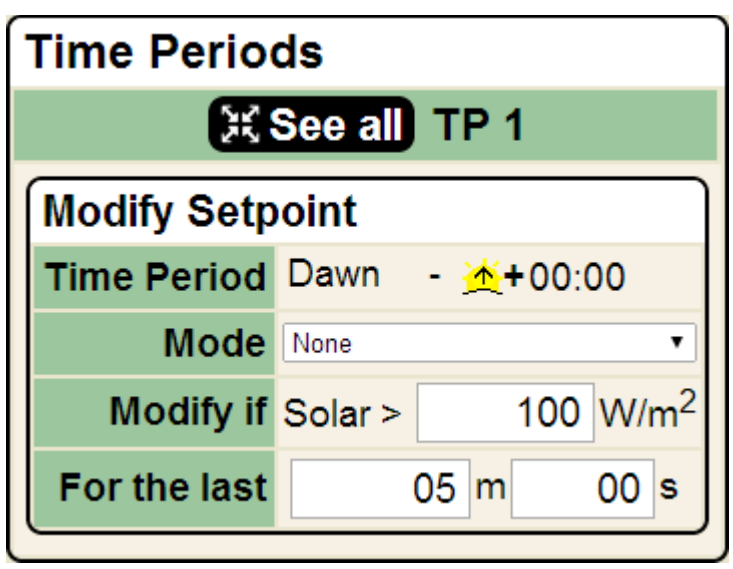
Group: Beds 1 & 2
Target: 0.45mS/cm^2
Members:
* Bed 1 Run Time: 1m16s
* Bed 2 Run Time: 3m10s

Time Periods



Modifiers are time period based settings this is a brief overview of what mode the modifiers are configured for in each one, as well as the name and start time of the particular time period. Pressing the expansion icon on each period will bring up additional modifier settings.

Time Period - Modify Setpoint



On expansion of each time period modifer settings will be displayed. Note that depending on the mode of the time period the information displayed might vary.

Time Period: Current time period name and start time.

Mode: The mode of the modifiers within this time period.

- ***None:*** No modifiers are allowed during this time period.
- ***Manual Only:*** Only manual modifiers are allowed.
- ***Solar Only:*** Only solar modifiers are allowed.
- ***Solar & Manual:*** Both solar and manual modifiers are allowed.

Modify if: This box set the level the solar intensity must reach in order for solar modifiers to be applied. The solar group solar reading is the source this is checked against. This must be properly configured under the group settings tab.

For the last: The solar level must be at this intensity (consistently) for at least this length of time before solar modifiers can be applied.

Modify

The modify box holds the actual modifier settings for the run time and nutrient target of the group. Depending on how the system and time period modify is configure this box may vary in appearance. If the mode has been set to none, this box will not be visible.

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Modify

Modify	Solar					Manual	
Nutrient Target	-	10	% /	100	W/m^2	-	5 %
Station Run Time	+	5	% /	100	W/m^2	+	2 %

The above box contains both nutrient target and run time modifiers as well as both solar and manual modifiers.

Modify: States what variable the modifier will be applied to.

Solar: Current solar modifier, note that in the example a solar intensity of at least 500W/m^2 is needed in order to allow modifiers. Here the Nutrient modifier is set to 10% / 100W/m^2 this mean when the intensity is reached for the desired amount of time, a 50% modifier will be applied. The modifiers are not proportional it will required a further 100W/^{2} before another 10% is added.

Manual: Manual modifiers are always added to the variable regardless of solar level so for the example above the nutrient target will modified by -5% and each stations run time by +2% while the system is in this time period.

Additional Modify layouts

Modify

Modify	Manual	
Nutrient Target	-	0 %
Station Run Time	+	0 %

Manual modifiers only.

Modify

Modify	Solar			
Nutrient Target	-	5 % /	100	W/m^2
Station Run Time	+	2 % /	100	W/m^2

Solar modifiers only.

Modify

Modify	Solar					Manual	
Station Run Time	+	0	% /	100	W/m^2	+	0 %

Solar & Manual modifiers on a none dosing system.

Settings

Settings

The setting tabs contains all the configuration for each group within the system.

General

General

Name	Beds 1+2
Enable	☑
Manual Group	☐
Enable Modifiers	☐
Priority	Low ▾

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Name: Name of the group, this should be keen unique as it is used for identification purposes elsewhere in the system. If this field is left blank the groups number will be used.

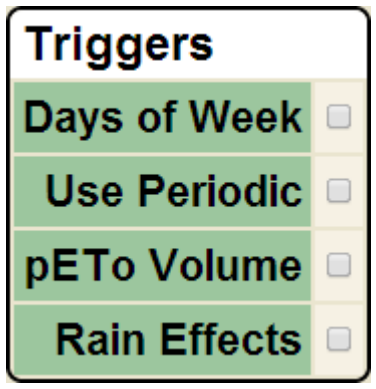
Enable: Where this group is enabled, this is the same setting as the enable on the main group tab. If not ticked this group cannot be triggered.

Manual Group: This will set the group to operate as manual group an additional tab will become available on the left hand side group menu. This will also change the Triggers tab label to Automatic to avoid confusing when configuring.

Enable Modifiers: This will enable modifiers to be used on the group. An additional tab will become available where these can be configured.

Priority: The Multigrow system has two levels of group priorities, setting this to high means that if this group is triggered it will interrupt any low priority running groups. Not a low priority group cannot interrupt a high priority group and a high priority group cannot interrupt another high priority group.

Triggers



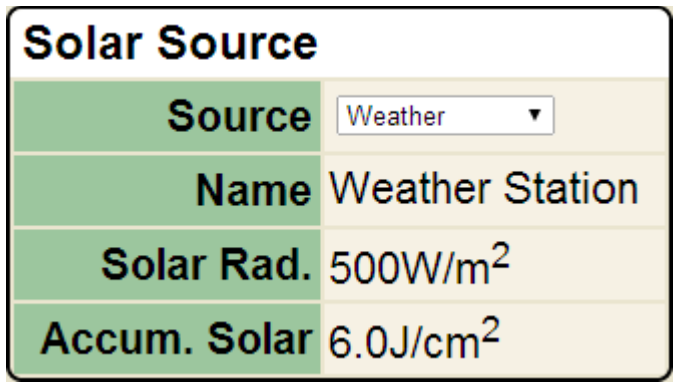
Days of Week: Ticking this box will enable you to select days of the week when this specific group can run. This effect all triggers except for Manual ones.

Use Periodic: If the group is to be triggered from periodic source such as solar, timer, etc. This box must be ticked an additional tab will become available where these triggers can be configured.

pETo Volume: If the group is use pETo triggers, this box must be ticked an additional tab will become available where this can be configured. Also additional options under the periodic triggers to use the pETo volume will become available.

Rain Effects: Does rain effect how this group irrigates.

Solar Source

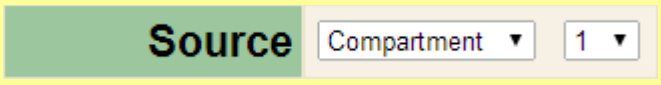


Each group can have it's own solar source configured, this is to be used in conjunction with the periodic solar trigger as well as solar modifiers.

Source: Source of the solar reading for the group.

- ***System:*** The solar information configured for the irrigation system is also used as this groups solar source.
- ***Compartment:*** A climate compartment solar reading is to be used as the groups solar source.
- ***Weather:*** The weather stations is the source of the solar reading this group will use.

If a compartment source is being used an additional setting box will be displayed this must be set to the number of the compartment the desired solar reading is coming from.



Name: Current name of the solar source, this will either be the name or number of the compartment, the current name or number assigned to the system or weather station.

Solar Rad.: Current solar radiation being reported from the solar source.

Accum. Solar: Accumulated solar the group has been exposed to since midnight.

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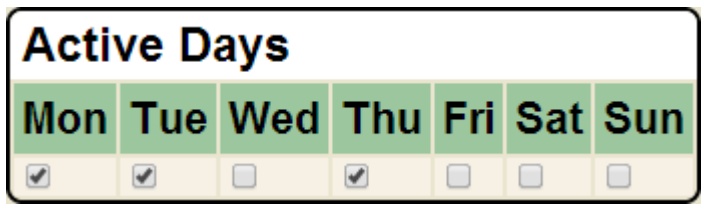
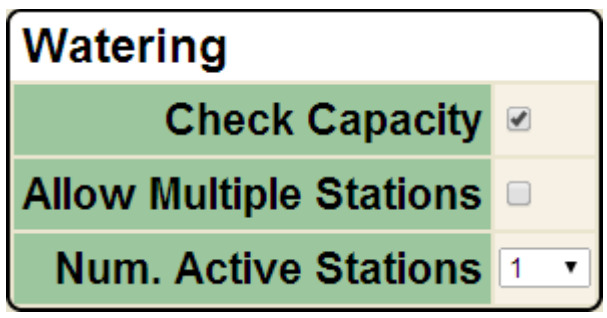
Active Days



If the Days of Week tick box is selected under the triggers box this box will be displayed. With in it whatever days of the week the group is allowed to run can be specified. Ticking the box underneath a corresponding day means that the system will be able to run on those days. Note if have selected the Days of Week box but have not specified any days the system will not run. This will effect all automatic and periodic triggers, only manual triggers can be processed on inactive days. In the above example the group can only automatically trigger on Monday, Tuesday and Thursday.

Watering

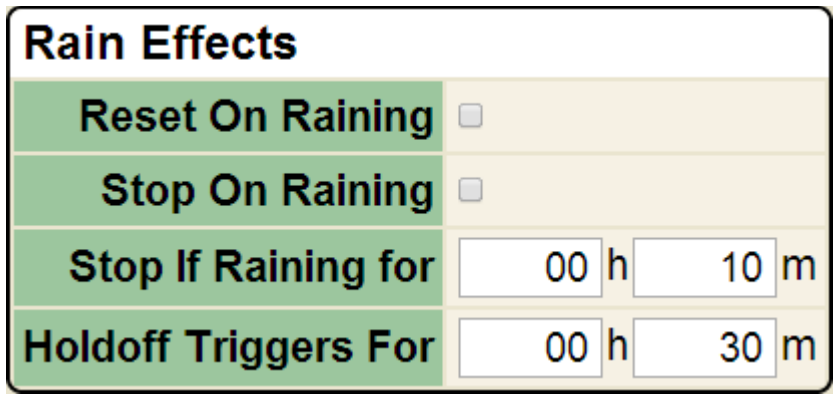


Check Capacity: If a group is set up to ignore capacity a station can run regardless of if there is adequate capacity through the pump. Unticking this box means that careful consideration and manual timing of stations needs to be used when multiple stations and concurrent groups are being used. It is advisable to leave this setting ticked and make sure the system capacity is properly set. If only one group and station is ever going to be run this setting is not really important as the system will always try to run at least one station even if it is over capacity.

Allow Multiple Stations: This will allow the group to run more than one station simultaneously this is useful if the pump capacity can easily provided enough water for multiple stations (zones).

Num. Active Stations: Set the number of stations that can be active at anyone time. The system will try to maintain this as long as the capacity isn't exceeded, unless the check capacity option is disabled.

Rain Effects



Is it possible for some group to contian stations that are directly exposed to rain. If this happens any periodic triggers for the system should reset. Also if the group is currently active and it start to rain the group can be stopped so water is not wasted.

Reset On Raining: Reset any periodic triggers that might be configured on the group.

Stop On Raining: Stop the group if irrigating and rain is detected.

Stop If Raining for: An irrigation will only be stopped if it has been raining for an X amount time. This setting is only taken into account if the Stop On Raining setting is enabled.

Holdoff Triggers For: If either the Reset on Raining or Stop On Raining settings are enabled and rain is detected, the system will hold of all triggers once it has stop for this time to insure a irrigation is not triggered directly after it has stopped raining.

Info.

The Info. box located on this page is exactly the same as the one on the Stations page for a group, please refer to the Stations section above for more information on this readings box.

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Readings

Groups Status

The groups page displays the above information but also changes colours depending on the current groups status the follow states and for are group are described below.

Groups Status

	State	Reason	Act. Count	Info	Last Sum	Rad. Sum	Trigger Level	Total Volume	Station	Action
All Beds	Off	User	1	16:38:35 Tue 19 Aug				55L		Irrigate Now
Grp. 2	Off	User	2	16:33:52 Tue 19 Aug	1.3J/cm^2	7.5J/cm^2	360.0J/cm^2	67L		Irrigate Now

Field	Description
State	Current state of the group
Reason	The last reason an action occurred on a group.
Act. Count	The amount of times the group has been active today.
Info	This will display the time when the group last changed state. If the group is active the Estimated Time remaining for its irrigation will also be displayed in this field.
Last Sum	If a group has solar triggers configured every time the group is triggered the current accumulated solar sum is recorded even if the trigger source was not a solar trigger.
Rad. Sum	The current level of the groups solar accumulator.
Trigger Level	The current trigger level of the group this will be displayed as XXJ/cm^2 if the trigger is displayed for the current time period.
Total Volume	The total volume the group has passed since midnight, this is based on the stations within the groups flow rates.
Station	When a group is active the current stations being irrigated will be displayed here along with their run times and the option to skip. If the group is set up to run multiple stations at once all active station will be displayed here.
Action	This field holds the User Action buttons for a group depending on the current state of the group the buttons displayed here will vary.

If a system is configured as inline an additional field will be present for every group called Correction Factors. Here the current corerection factors for both the nutrinet and pH dosing modules are displayed.

Correction Factors
Nutrient: 100% pH: 100%

Disabled

Disabled	Solar	8	10:42:21 Wed 20 Aug	9.1J/cm^2	0.6J/cm^2	9.0J/cm^2	1890L		

If a group is disabled on the Settings -> Groups main overview the group will become grey, this will also remove any action buttons from the group. A disabled group cannot be trigger by any means even manually it must be enabled first. If the solar trigger was is enabled on a disabled group all the relative solar information will still be displayed and the Rad. Sum will still be accumulated by the group.

Off

Off	Time Out	5	10:19:31 Wed 20 Aug	3.6J/cm^2	8.3J/cm^2	9.0J/cm^2	1575L		Irrigate Now

When a group is inactive all relative information for the group is displayed, the only valid action from an off group is to manually Irrigate Now. The reason and info listed in an off group are the information from the last irrigation for the group.

Pending

Pending	User	6	10:30:35 Wed 20 Aug	0.7J/cm^2	0.7J/cm^2	9.0J/cm^2	1587L		Clear Pending

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If a group is triggered by cannot run yet because maximum number of groups or system capacity has been reached the group will become pending. WHen this occurs the group will turn a light blue to indicate this, when a group is pending it can be manually cleared by pressing the Clear Pending button now visible in the action field.

Pending (Batch System)

Pending Filling	User	0	16:32:10 Tue 19 Aug	16.9J/cm^2	17.0J/cm^2	360.0J/cm^2	0L		Clear Pending

When a group is trigger on a batch system the group must wait for the batch tank to be ready, this makes the group enter the pending state but being held off by the batching module. The group will turn a blueish colour to indicated this, the current state of the batching module will also be displayed in black underneath the Pending state message. Like a normal pending group these groups can also be cleared, note that if this happens the batching system will continue to run until a stable state is achieved. If the group is cleared the batch system will stop dosing but will continue to fill or complete a stir cycle if that was the operation it was doing, the tank will most likely be left in a waiting full state if this sequence occurs.

On

On	User	2	16:33:51 Tue 19 Aug ETR: 0h 0m 47s	1.3J/cm^2	0.1J/cm^2	360.0J/cm^2	35L		Name	Time Remaining	Skip	Pause Now Cancel Now
								Stn 1	Bed 1	0m 56s	Skip Now	

When a group becomes active it will turn green to indicated this, the state will also be updated to On. When a group becomes active the info box will be updated with the time of the trigger plus display the estimated time remaining for the group. Since a group has no knowledge of when it maybe interrupted or held of because of flow the time is only an estimate. The station field will also be populated with the active stations within the group. While a group is active the action button changes to Pause Now and Cancel Now these are the two valid options.

On (Multiple Stations)

On	User	9	10:45:19 Wed 20 Aug ETR: 0h 10m 25s	2.1J/cm^2	0.4J/cm^2	9.0J/cm^2	1913L		Name	Time Remaining	Skip	Pause Now Cancel Now
								Stn 1	Bed 1	9m 35s	Skip Now	
								Stn 2	Bed 2	0m 35s	Skip Now	

If a group has been setup to use multiple stations it will operate exactly the same as a single stations group. The stations field will just contain more enters for the number of stations the group is allowed to run. If the group does not or cannot run the maximum number of stations as allowed field will still be displayed.

	Name	Time Remaining	Skip
Stn 1	Bed 1	8m 41s	Skip Now
Stn 2		0m 0s	Skip Now

On (Pending)

On (Pending)	Time Out (Time of Day (Auto))	4	16:47:49 Tue 19 Aug ETR: 0h 5m 13s	0.8J/cm^2	3.9J/cm^2	9.0J/cm^2	280L		Name	Time Remaining	Skip	Pause Now Cancel Now Clear Now
								Stn 1	Bed 1	5m 24s	Skip Now	

A group may take a long time to finish a single irrigation cycle of all the groups configured. It is possible that since the time the group has started a new trigger has been requested for the group even though it is still active. If this happens the new trigger will be queued (Pending) until the group has finished running, once the group has finished irrigating it will then process the pending trigger and the group will start running again. In this state the (Pending) will appear under the on label, the reason for the pending trigger will also be displayed under the current active reason. The action field will also contain three buttons; Pause will pause the current active irrigating, Cancel will can the current active group (Note that the pending trigger will be processed once the group is cancelled) and Clear which will clear the pending trigger but not effect the current irrigation (Note a pending trigger cannot be cleared when a group is paused it must be resumed first).

If a second group has been pending before the first group generates a pending trigger the secondary group will become active before the current group is allowed to restart again.

Paused

Group Pause

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Paused	User	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	5.8J/cm^2	9.0J/cm^2	312L		Name	Time Remaining	Skip	Resume Now
								Stn 1	Bed 1	4m 13s	Skip Now	Cancel Now

Once a group is running the Pause Now button becomes available pressing this will stop the current irrigation for that group and hold its current progression. This can allow another group to run or to fix a problem within an active group without having to restart the group. In this state the group will turn a light purple colour, the reason will become User and the stations within the group will be appended with (Paused). In this state the group can be resumed or cancelled using the appropriate buttons, Note if other groups are pending they will immediately start running once the active group is paused.

System Pause

Paused	Pump Error	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	7.0J/cm^2	9.0J/cm^2	322L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	8m 57s	Skip Now	

When a system pause occurs on with the irrigation system all active groups on the system will be paused it will also stop any additional groups from being triggered. When a system pause occurs the reason will be overwritten with the pause reason of system and the group will become a light purple colour.

System Pause (User)

Paused	System Pause	12	11:46:25 Wed 20 Aug ETR: 0h 11m 2s	3.3J/cm^2	3.3J/cm^2	9.0J/cm^2	2298L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	8m 34s	Skip Now	

A whole irrigation system can be manually paused on the Readings -> Status page this will cause all active groups to groups on the system to be paused. This will cause the group to change to light purple colour and update the reason of the group to system pause to indicate that this has happened. This differs from a group pause because no other groups on the system can run or be resumed only by resuming the whole system will groups become active again. It is possible however to cancel a paused group in this condition.

Interrupted

Interrupted	User	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	9.7J/cm^2	9.0J/cm^2	345L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	9m 9s	Skip Now	

It is possible for a group to be set up as a high priority group, if a high priority groups becomes active while a low priority group is irrigating the low priority group will be interrupted. When this happens the low priority group is paused until the high priority group has finished running. A group will only be interrupt if either the max number of active groups has been reached or the system capacity will be exceeded otherwise both groups will run concurrently. If a group is interrupt it will turn light purple the reason will also change to User.

Dosing

Install

General	
Nutrient Dosing	☑
pH Correction	☑
Sample Pot Pump: ☑	3 . 0
Stir Pump: ☑	3 . 1

Nutrient Dosing: This box must be ticked if nutrient dosing is to be used within the batch system.

pH Dosing: This box must be tick if pH correction is to be done on the batch system.

Sample Pot Pump: Ticking this box will enable the use of a "Sample Pot Pump" on the system which is used to pump dosed water into a sample pot for measurement. This will also enable an output expander address to be input.

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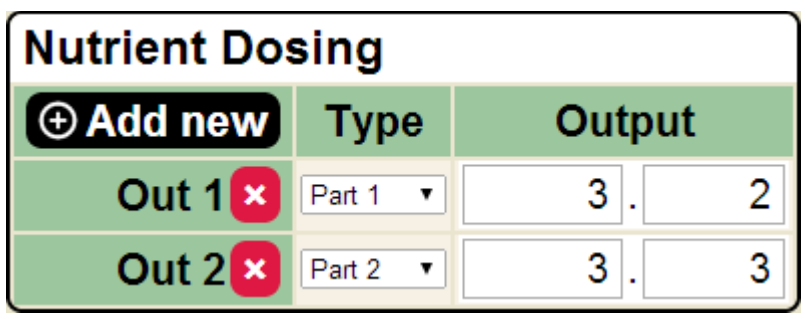
Stir Pump: Ticking this box will enable the use of a Stir Pump within a continuous system. This will also enable an output expander address box to be configured.

Mode: Controls how the Nutrient and pH dosing valves work together in the system. If all the dosing valves are wired on to the same output expander it is possible for them to all turn on at the same time. This may cause a large inrush of current which the output expander might not be able to handle.

- ***Simultaneous:*** Both the nutrient and pH dosing valves will act independently of each other.
- ***Sequential:*** Nutrient and pH dosing valves cannot operate at the same time.

Nutrient Dosing

If the Nutrient dosing has been installed the option for added nutrient dosing valves will become available. Each irrigation system can support up to 10 different nutrient parts, except for a watering system where no dosing can be installed.

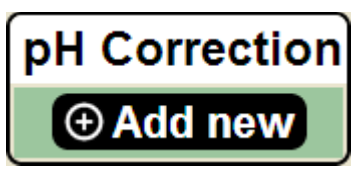


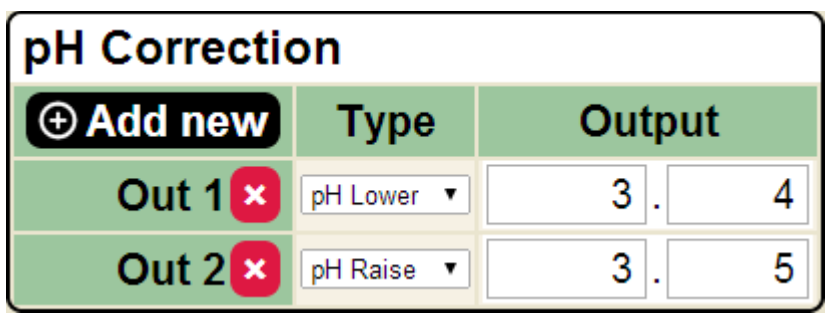
Type: Once a valve is installed the type field can be seen, this is used to specify which Part of the nutrient mix this valve is physically connected to.

Output: Address of the output expander this valve is wired to, see section 3.1 configuring a single output for more information.

pH Correction

If the pH dosing has been installed the option for added dosing valves will become available. Each irrigation system can supports both raise and lower pH correction, except for a watering system where no dosing can be installed.





Type: Once a valve is installed the type field can be seen, this is used to specify which type of pH correction raise or lower this valve is physically connected to.

- ***pH Raise:*** When this output is driven Alkali will be dosed into the system raising the pH.
- ***pH Lower:*** When this output is drive Acid will be dosed into the system lower the pH.

Output: Address of the output expander this valve is wired to, see section 3.1 configuring a single output for more information.

Settings

An inline system makes use of two different dosing methodologies in order to make both the Nutrient and pH dosing effective. Both dosing module use closed loop control in order to adjust dosing rate of the output in order to achieve the target. The outputs use a PWM mode to do this, this means a percentage is calculated and applied to the output based on dose time.

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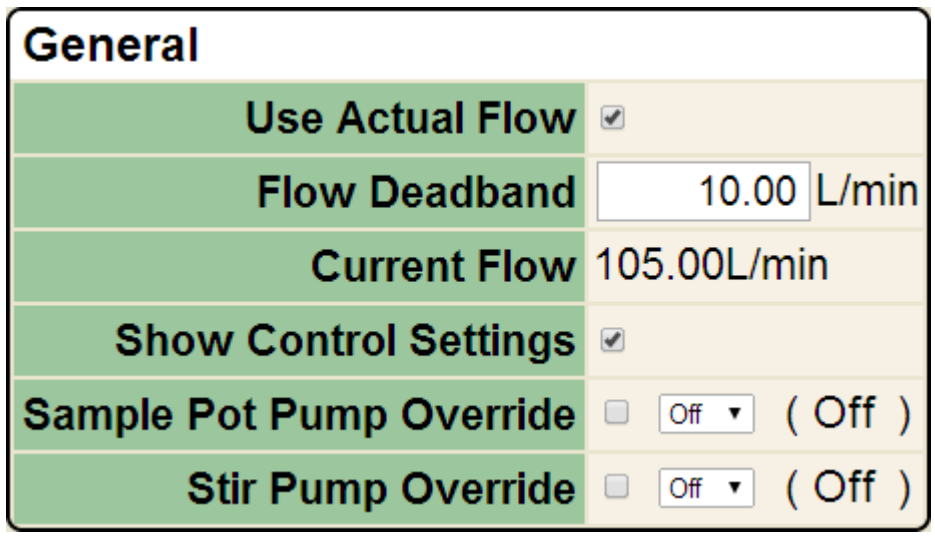
General



Use Actual Flow: If a flow meter has been installed on the system the flow from this can be used to effect the dosing. Otherwise the calculated flow provided by active stations will be used. Note if the flow rates of the stations are configured accurately then using the actual flow will not improve the performance of the dosing system unless random flows can be introduced to the system via stations or hand taps that are not controlled by the MultiGrow.

Flow Deadband: If the actual flow is going to be used this box will become available. When the actual flow of the system might only vary slightly so re-calculating dose rates based on tiny variations is point less. The deadband set the minimum amount of change in the flow rate need before a new dose rate should be calculated.

Current Flow: The current flow being reported to the system by the Measure EpM sensor group.

Show Control Settings: Inline dosing uses a very complex closed loop control method for calculating dose rates, if you wish to see these settings and tweak them this must be ticked.

Sample Pot Pump Override: If a sample pot pump has been installed in the dosing system it can be software overridden here. Ticking this box will force the output to position specified in the drop down box.

Stir Pump Override: If a stir pump has been installed in the dosing system it can be software overridden here. Ticking this box will force the output to position specified in the drop down box. Note a stir pump output will become active whenever dosing is called for by the system.

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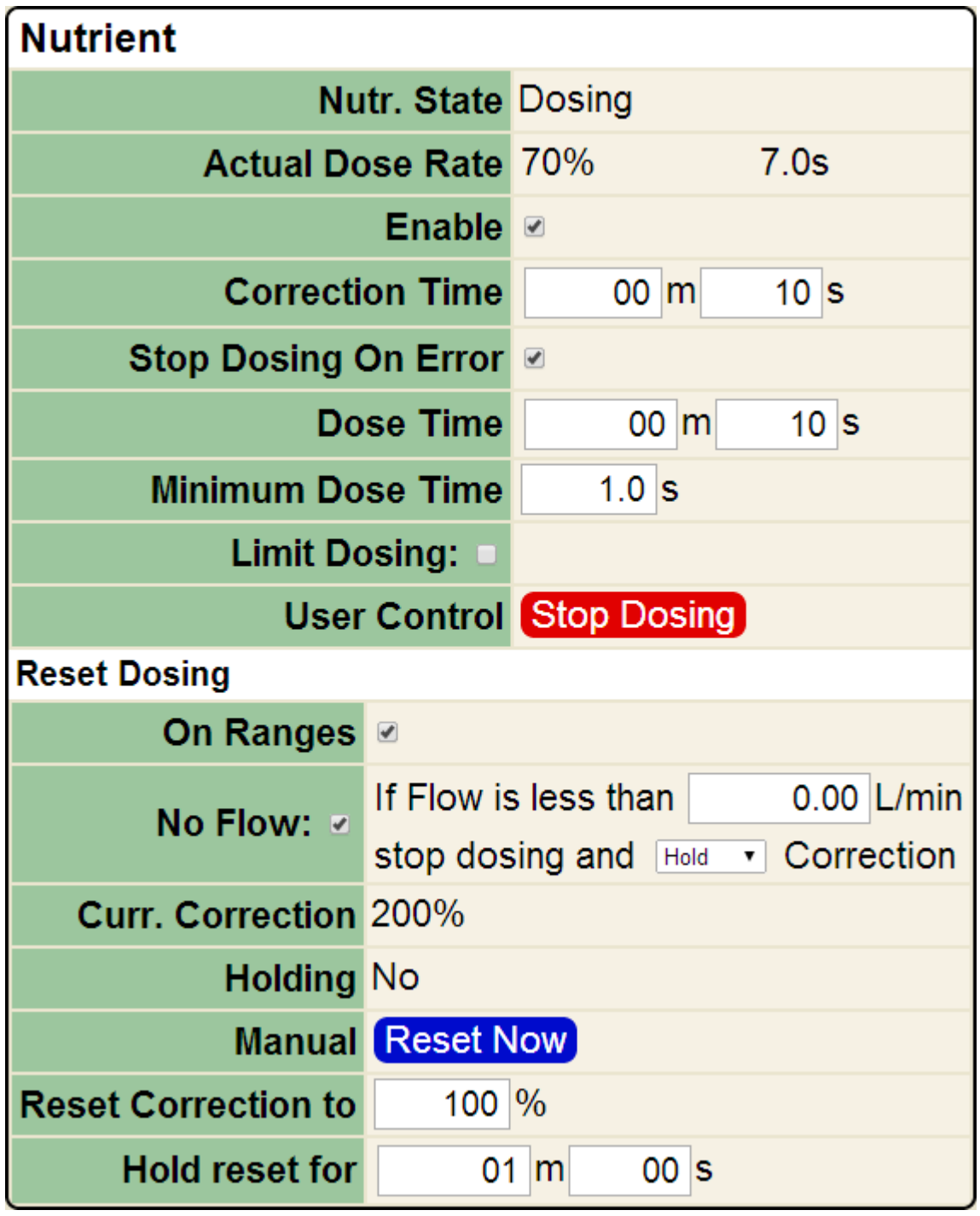
Nutrient



Nutrient inline dosing on a MultiGrow system uses a correction factor algorithm in order to estimate the desired dose rate then modify this factor in order to achieve the target. This algorithm makes use of the source nutrient level and recipe effect in order to obtain a fast response, these should be configured properly in order to achieve the best results. Note that the nutrient module uses a closed control loop to modify the dose rate so even if these are incorrectly set the target will still be achieved just less effectively.

The dose time for each part of recipe are calculated using the dose rate derived from the correction factor. The calculated dose rate represents the 100% value for the recipe parts.

Nutrient Dose Rate Example:
Recipe
Part 1: 100%
Part 2: 50%

Dose Time: 10s
Dose Rate: 70%

On time for Part 1 output = 70% * 10s * 100% = 7.0s
On time for Part 2 output = 70% * 10s * 50% = 3.5s

Nutr. State: Current state of the nutrient dosing module.

Actual Dose Rate: This is the dose rate currently being actioned by the controller the time the output will be on for is also calculated and displayed here.

Enable: This is a blanket enable for the nutrient dosing module, this must be ticked for any nutrient dosing to be done by the system.

Correction Time: In order for a new dose rates effects to be properly observed a small time window is need where the nutrient level will be averaged.

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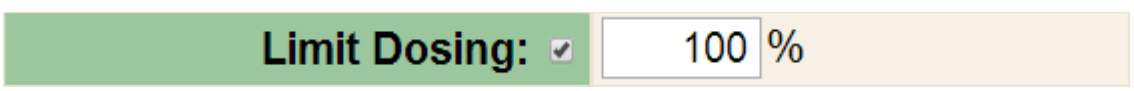
It is advised to set this to no shorted than the dose time or in multiples of it.

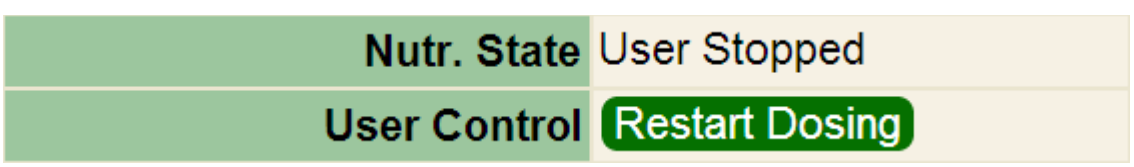
Stop Dosing On Error: It is possible for the system to continue to dose at the last calculated dose rate even if the current sensor reading has disappeared. Ticking this box means that the dosing will stop if the nutrient reading is ever lost.

Dose Time: This is the maximum time the dosing output can ever be on for.

Minimum Dose Time: This is the minimum time the dosing output can be on for, this may not necessarily be what is calculated as above. If the calculated dose time is 0.8s the output will not be turned on until this value is above the minimum (1.0s)



Limit Dosing: This will force the output to run at a fixed dose rate and ignore any of the calculated values. If this box is ticked the dose rate set in the now visible box will be applied to the dosing outputs.

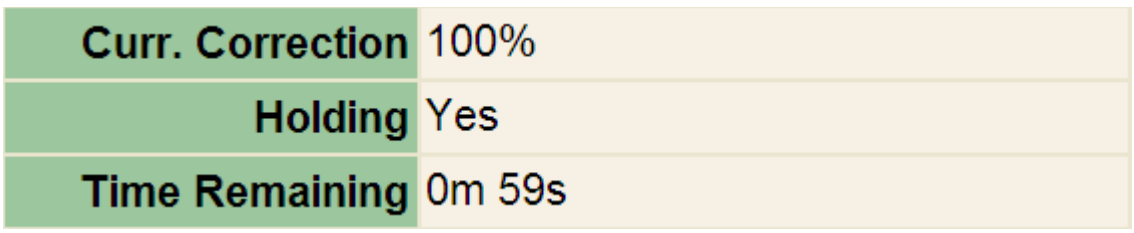


User Control: Pressing the stop dosing now button will immediately stop all the dosing for the nutrient module. Once stopped the Nutr. State will change to indicates this and a resume now button will appear in this box. Pressing the resume now button will immediately start the nutrient dosing module again.

On Ranges: If dosing ranges have been configured on the current active program going outside these will force the correction factor of the module to be reset to the desired level.

No Flow: Ticking the no flow box will reveal these settings. If the system is trying to irrigation but the flow drops below the specified level the module will stop dosing and either reset or hold the correction factor.

Curr. Correction: This is the current calculated correction factor for the system this is the amount the system has had to increase or decrease the dosing in order to achieve the desired nutrient level.



Holding: If any of the reset conditions have been meet the correction factor will be held for the time specified. If hold an additional time remaining box will be visible.

Manual: This will force an immediate reset of the correction factor.

Reset Correction to: Specifies the exact value the correction factor will be reset to by any of the reset reasons.

Hold reset for: How long the correction factor will be held at the reset value for.

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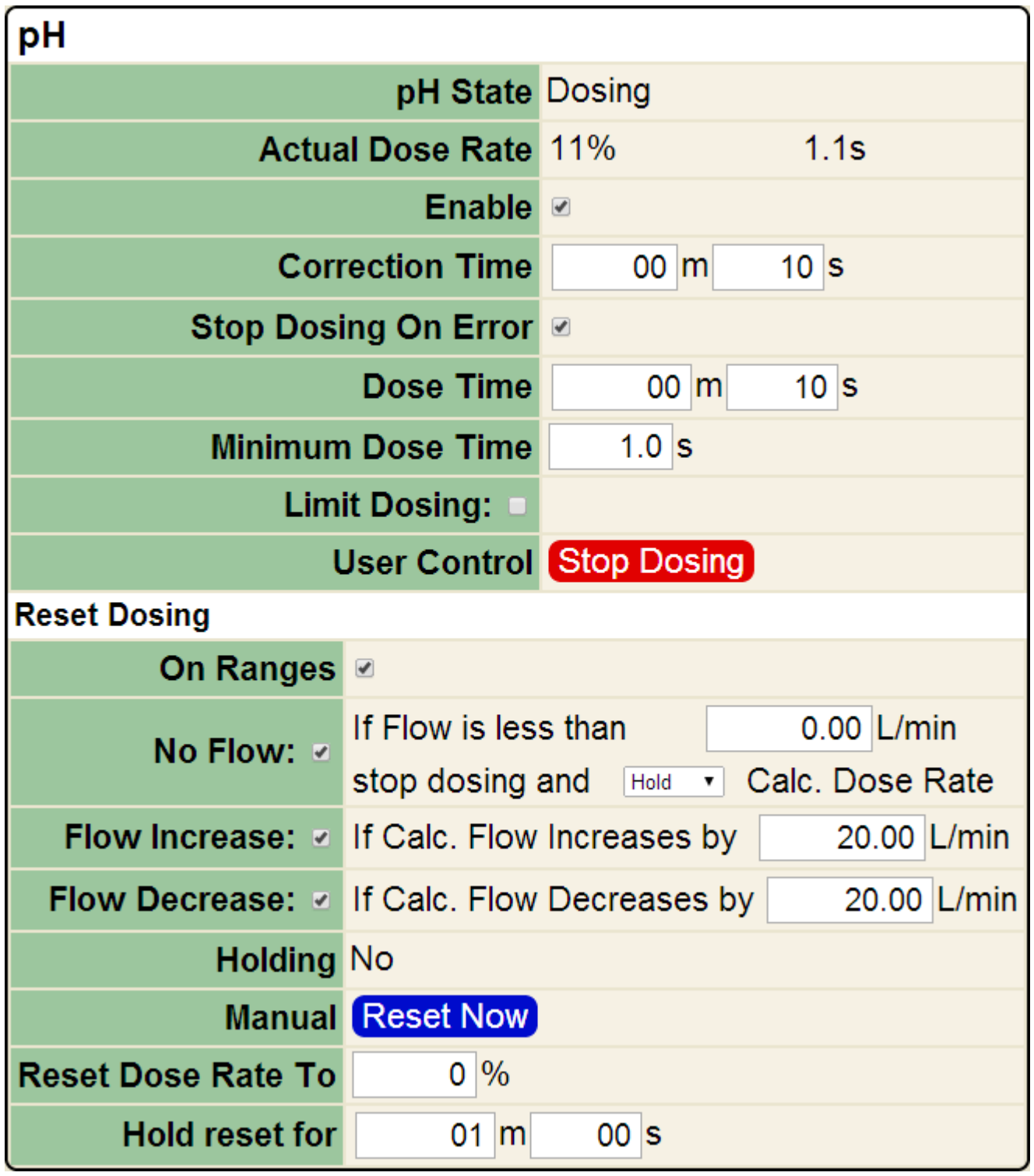
pH



pH inline dosing on a MultiGrow system uses a PID algorithm in order to calculate the desired dose rate of the module to achieve the target.

pH State: Current state of the pH dosing module.

Actual Dose Rate: This is the dose rate currently being actioned by the controller the time the output will be on for is also calculated and displayed here.

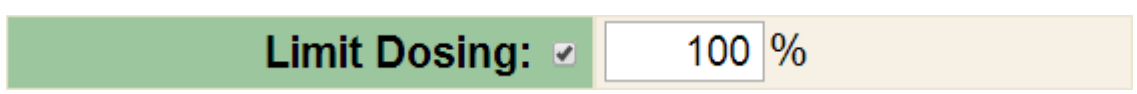
Enable: This is a blanket enable for the pH dosing module, this must be ticked for any nutrient dosing to be done by the system.

Correction Time: In order for a new dose rates effects to be properly observed a small time window is need where the nutrient level will be averaged. It is advised to set this to no shorted than the dose time or in multiples of it.

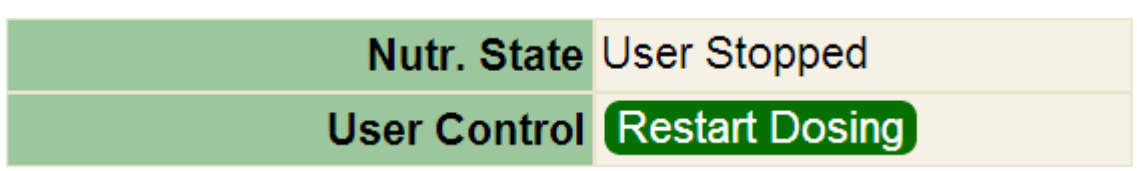
Stop Dosing On Error: It is possible for the system to continue to dose at the last calculated dose rate even if the current sensor reading has disappeared. Ticking this box means that the dosing will stop if the pH reading is ever lost.

Dose Time: This is the maximum time the dosing output can ever be on for.

Minimum Dose Time: This is the minimum time the dosing output can be on for, this may not necessarily be what is calculated as above. If the calculated dose time is 0.8s the output will not be turned on until this value is above the minimum (1.0s)



Limit Dosing: This will force the output to run at a fixed dose rate and ignore any of the calculated values. If this box is ticked the dose rate set in the now visible box will be applied to the dosing outputs.



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User Control: Pressing the stop dosing now button will immediately stop all the dosing for the nutrient module. Once stopped the pH State will change to indicates this and a resume now button will appear in this box. Pressing the resume now button will immediately start the module again.

On Ranges: If dosing ranges have been configured on the current active program going outside these will force the correction factor of the module to be reset to the desired level.

No Flow: Ticking the no flow box will reveal these settings. If the system is trying to irrigation but the flow drops below the specified level the module will stop dosing and either reset or hold the pH dose rate.

Flow Increase: Since a flow change can cause an non-linear effect on the pH the dose rate can also be reset on just if the flow has increased by a the amount specified here.

Flow Decrease: Since a flow change can cause an non-linear effect on the pH the dose rate can also be reset on just if the flow has decreased by a the amount specified here.

Holding	Yes
Time Remaining	0m 59s

Holding: If any of the reset conditions have been meet the correction factor will be held for the time specified. If hold an additional time remaining box will be visible.

Manual: This will force an immediate reset of the correction factor.

Reset Dose Rate To: Specifies the exact value the dose rate will be reset to by any of the reset reasons.

Hold reset for: How long the dose rate will be held at the reset value for.

Advanced Nutrient Settings

Advanced Nutrient Settings	
Info.	
Current Reading	0.23mS/cm^2
Target	1.00mS/cm^2
Dose Rate	67%
Settings	
Min. Correction Factor	0.00
Max. Correction Factor	2.00
Override CF Nudge below	0.30
Minimum Nudge	0.05
Proportional Gain	0.50
Derivative Action	1.00

It is possible to further modify the more advanced settings of the control algorithm for the nutrient dosing, it is only recommended to do this if an in depth understanding of control systems. Changing any of these settings places all resulting effects on the user.

Current Reading: Current nutrient reading being reported by the Measure EpM sensor group.

Target: Current nutrient level the system is trying to maintain.

Dose Rate: Current dose rate calculated by the control loop.

Min. Correction Factor: The lowest possible value the correction factor can be.

Max. Correction Factor: The largest possible value the correction factor can be.

Override CF Nudge below: If the correction factor ever drops below this it may take a long time for it recover due to the proportional nature of the nudge size. If the system ever calculates a correction factor below this the nudge size will be overridden to the minimum nudge size.

Minimum Nudge: Minimum nudge size the system will apply whenever then correction factor drops below the Override level.

Proportional Gain: P factor of the PD control loop.

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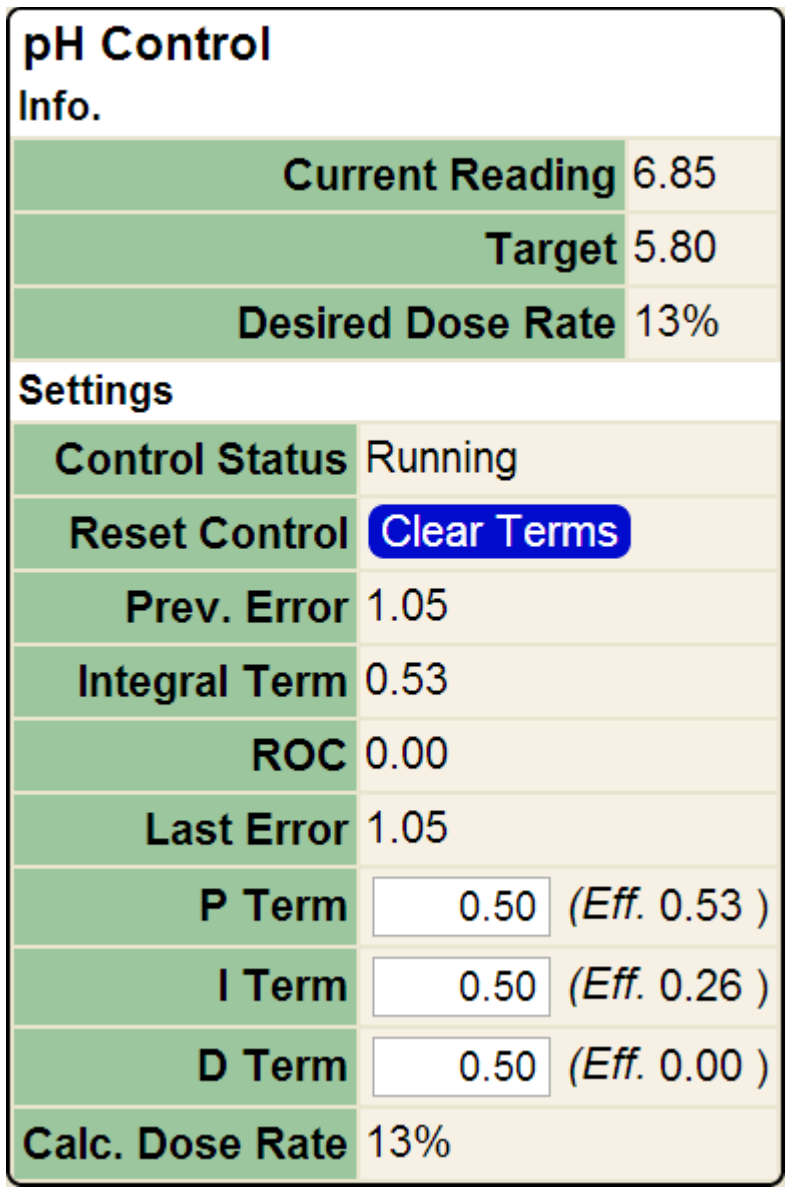
Derivative Gain: D factor of the PD control loop.

pH Control



It is possible to further modify the more advanced settings of the control algorithm for the pH dosing, it is only recommended to do this if an in depth understanding of control systems. Changing any of these settings places all resulting effects on the user.

Current Reading: Current pH reading being reported by the Measure EpM sensor group.

Target: Current pH level the system is trying to maintain.

Desired Dose Rate: Current dose rate the module is trying to apply to the output, this could be because of a Reset, Fixed Dosing or Control Loop.

Control Status: Current state of the PID control loop on the module.

Reset Control: Pressing the clear terms button will reset all the current control loop variables back to zero.

Prev. Error: The pH error calculated since the last correction time.

Integral Term: Current integral term the control loop is using.

ROC: The rate of change being measured by the system.

Last Error: The error calculated for the last control loop cycle.

P Term: P factor of the PID control loop.

I Term: I factor of the PID control loop.

D Gain: D factor of the PID control loop.

Calc. Dose Rate: Current dose rate being calculated by the control loop, this differs from the desired dose rate above.

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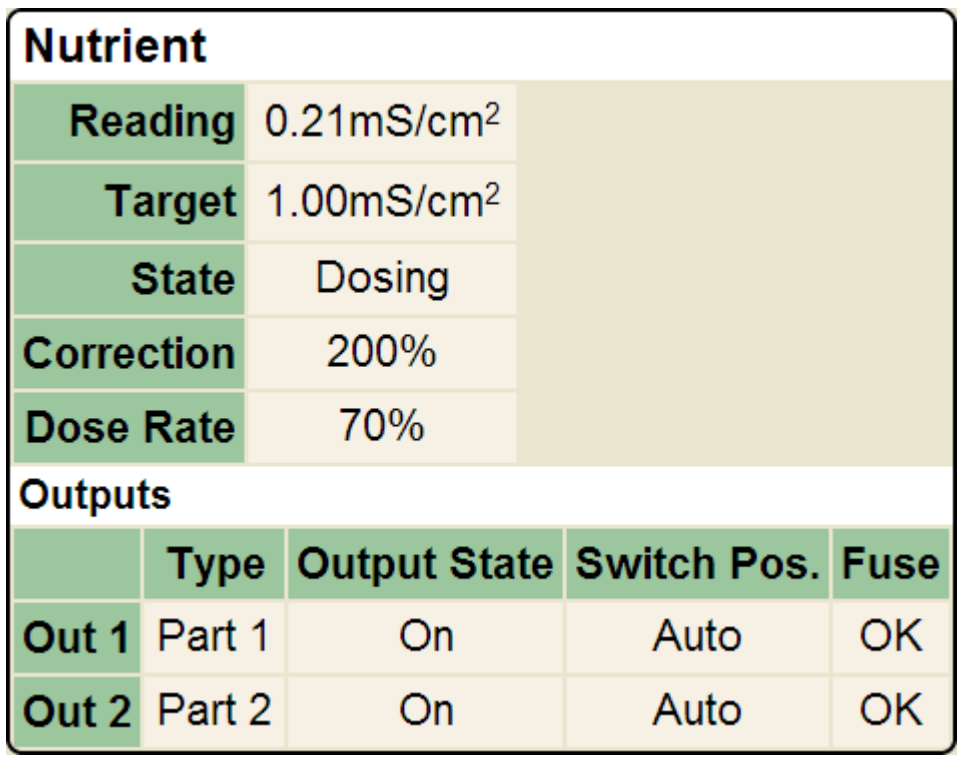
Readings

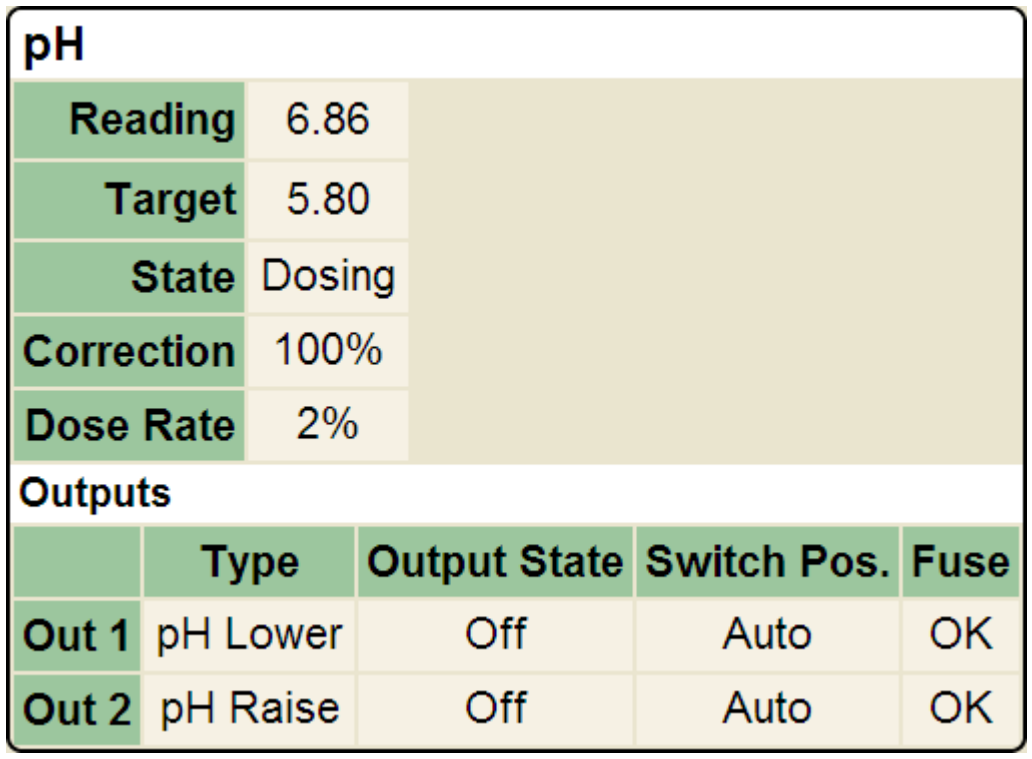
Nutrient



For this box to be visible nutrient dosing needs to be installed on the current irrigation system.

Field	Description
Reading	Current nutrient reading for the system based on the inputs from the Measure EpM sensor group.
Target	Current nutrient target set by the program, this is what the nutrient dosing module is trying to achieve on the system. Since the system can have a different program for each group when there is not a group active this will be reported as XXmS/cm^2, this is actually not an error unless the dosing system is suppose to be active.
State	Current state of the module.
Correction	Current correction factor being applied to the dosing algorithm.
Dose Rate	Current dose rate the system is running the nutrient outputs at, this is the percentage of the dose time specified on the settings page.
Outputs	
Type	What part this output has been configured to dose.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

pH



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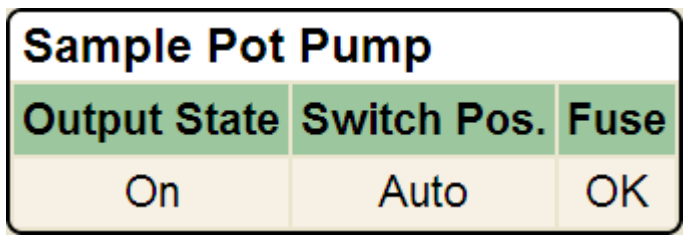
For this box to be visible pH dosing needs to be installed on the current irrigation system.

Field	Description
Reading	Current pH reading for the system based on the inputs from the Measure EpM sensor group.
Target	Current pH target set by the program, this is what the pH dosing module is trying to achieve on the system.
State	Current state of the module.
Correction	Current correction factor being applied to the dosing algorithm.
Dose Rate	Current dose rate the system is running the pH outputs at, this is the percentage of the dose time specified on the settings page.
Outputs	
Type	What part this output has been configured to dose.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

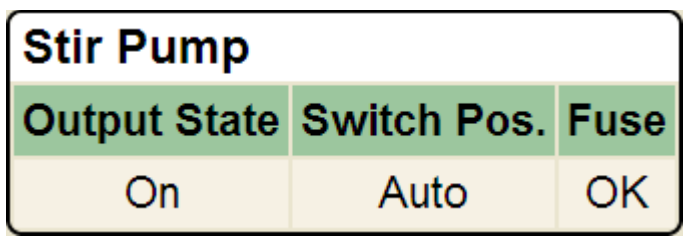
Sample Pot Pump



If a sample pot pump has been installed on the system this box will become visible. A sample pot pump is active whenever the system is irrigating.

Field	Description
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Stir Pump



If a stir pump has been installed on the system this box will become visible. A stir pump is active whenever the system is currently irrigating.

Field	Description
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

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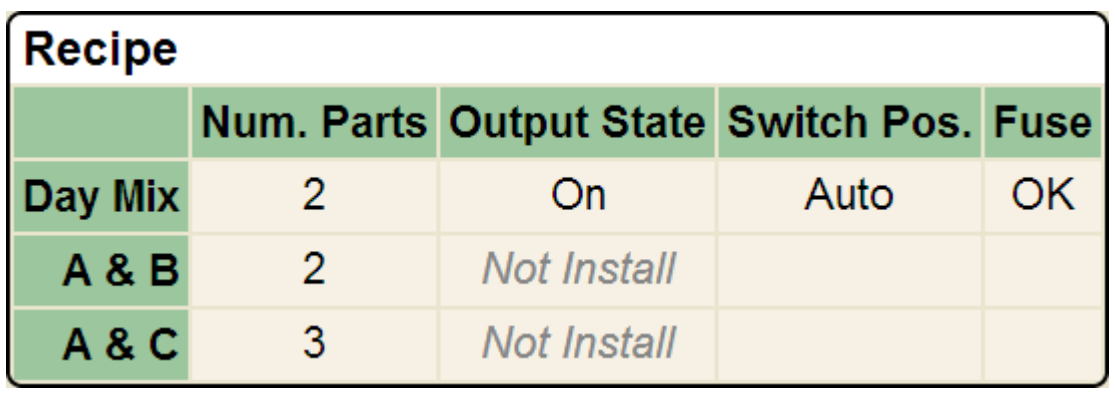
Recipe



This box shows a brief overview of the recipes installed on the system and the number of parts they use, these are configure under the settings section for the system. If a recipe selection output has been configured the state of this output will also be shown here.

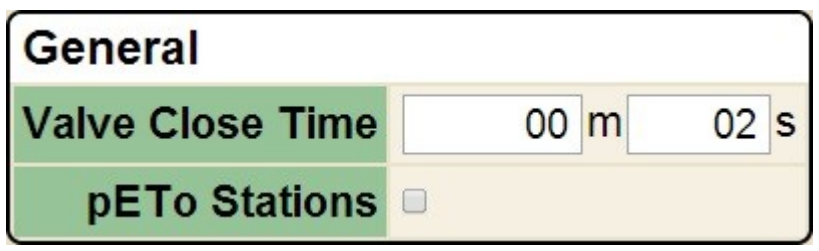
Field	Description
Num. Parts	Number of part s configured on the recipe.
Output State	The current state of the output if installed, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Stations

A Station or zone is used to logically separate watering valves within a system. One Multi controller can support up to 300 different Stations or Zones.

Configuration

General



Valve Close Time: Most valves require a certain amount of pressure in order to close correctly. This means the pump must be running but the station output itself must be off. This is the time need in order to this to happen.

pETo: pETo is an advanced controlling methodology based around the Evapotranspiration model of plants. This is a very complex control method that should only be used if a full understanding of those this model works. This option is only available on In line and Batched systems.

Stations

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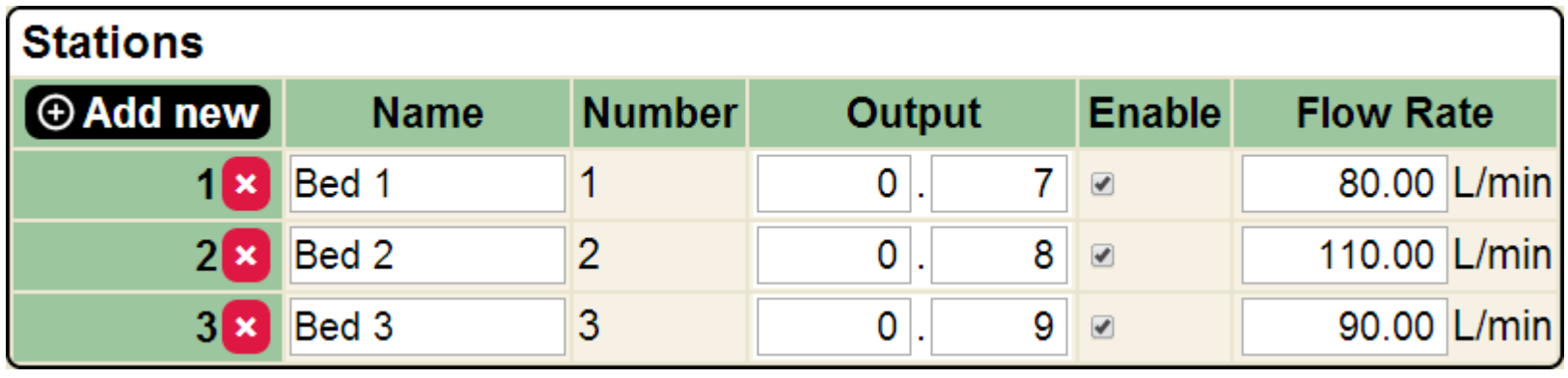


Name: This is a unique name given to a specific station within the system. The name itself has no effect on control but is useful for identification elsewhere in the system. It is also used for alerting.

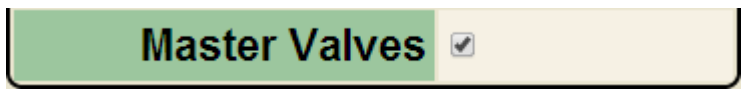
Number: This is an index generated by the system for the corresponding stations it will be used for identification if the name is left blank.

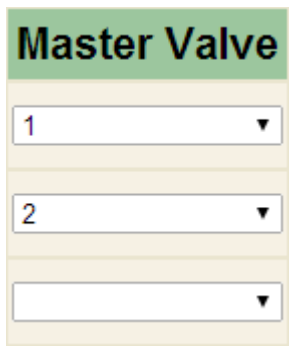
Output: This is the physical output this station is wired. Please refer to section 3.0 Outputs for information about this field.

Enable: A global enable for the station, if a station to be used in watering this must be ticked. Un-ticking it will make this station unable to be watered by the system. This can be useful if this station has becoming faulty it can be disabled globally in one place.

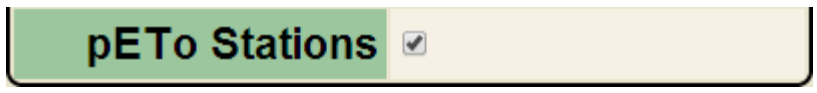
Flow Rate: In order for the system to acknowledge there is a problem with a station, the flow throughput of the station must be known to the system. Once this station becomes active the system will expect the flow rate to be at a certain level based on this setting. Seeing too big of a variation in this reading the system can determine if a problem has occurred.

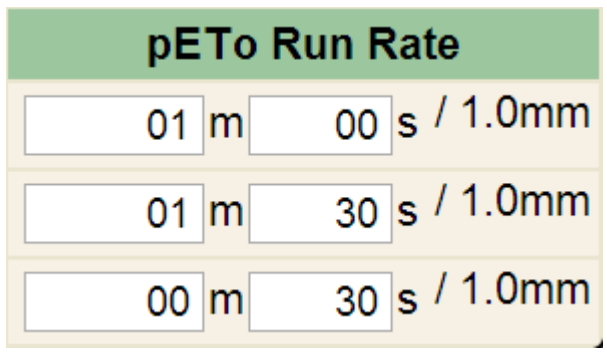
Master Valve: If master valve are configured on the system, stations can be assigned to use them. Match the number in this drop down box to a Line Number of a particular master valve, in order to turn this valve on when this station becomes active. If this is left blank no master valves will be switched on when this station is running.





pETo Run Rate: If the pETo Stations has been ticked this option will be available. A pETo run rate can be specified for each station the use of this run rate is specified later under the groups setting page.





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Readings

Stations						
	Enabled	Act. Count	Accum. Vol.	Output State	Switch Pos.	Fuse
Bed 1	Yes	1	32L	Off	Auto	OK
Bed 2	Yes	1	46L	Off	Auto	OK
Bed 3	Yes	1	36L	Off	Auto	OK
Bed 4	Yes	1	28L	On	Auto	OK

Enabled: This reading relates to whether a stations is enabled or not on the system, this is set using the enabled configuration option for the station. If the station is not enabled here it will not be able to be watered by any group.

Act. Count: Current times the stations has been active today, this includes manual operations. Note when counting manual operations the time the satiation is on is not taking into account simply that it has become active. Even if this is only switched on the off for a small interval this count will increase.

Volume: If a flow meter has been installed in the system an this column will visible this holds the current volume for a station. If the station is not active this will be the volume passed through the station during the last irrigation. When a new irrigation starts on this station this value is reset and starts accumulating again.

Accum. Vol.: Current volume the station has passed today, this is reset at the systems end of day.

Outputs State: Current state of the output.

Switch Pos.: Current switch position of the assigned output.

Fuse: Current state of the fuse for the assigned output.

Water System

Configuration

General

General		
System Capacity	100.00	L/min
Main Pump: ☑	1 . 1	

System Capacity: This setting is important for irrigation systems. It specifies the water throughput capability of the system, this is used to determine if multiple stations or multiple groups can run. It can also be used in certain aspects of dosing.

Main Pump: Ticking the main pump box will display the output assignment box for the pump. A main pump is the pump used for irrigation of the zones, in some cases this can also be used to stir the batch tank.

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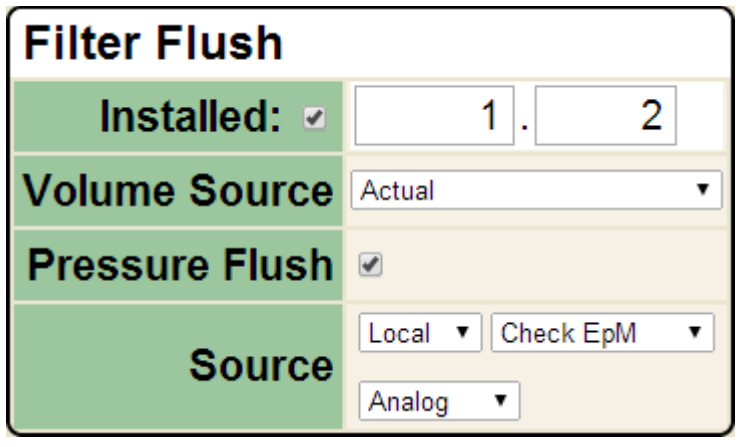
Filter Flush



Installed: If the irrigation system has a filter installed it is usually recommended to flush this periodically. Ticking this box will enable an output to be assigned to the filter flush. When flushing this output will becoming active.

Volume Source: It is possible to select the filter flush on volume to look at either the actual or calculate volumes used on the system.

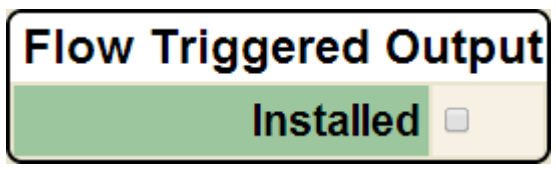
- ***Calculated:*** The filter flush will use the calculated volume reading in order to trigger a filter flush. Note that the calculated volume is derived from the flow rate set under each station with in a system, these values must be correctly enter for accurate results.
- ***Actual:*** The filter flush will use the actual volume reading to trigger. Note that this value is derived using the actual flow supplied by the Measured EpM sensors. A flow meter must be properly configured on the system in order to use this volume correctly.

Pressure Flush: A filter flush can be triggerd from a pressure sensor. A pressure sensor is used to detect when the filter has become to blocked and needs to be flushed.

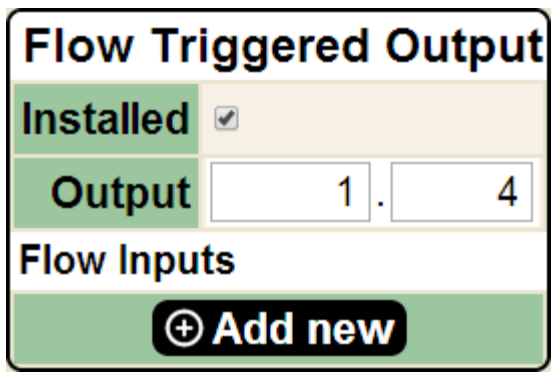
Source: The input where the pressure sensor is physically wired in to. This can be Main or Local EpM sensors CC or Analog (Moist) input.

Flow Triggered Output

A flow triggered output is a general purpose output that can be configured to turn on when flow is detected from any number of sensor sources. Flow levels can be adjusted to make sure the output will only turn on when a certain amount of flow has been detected.



Installed: Ticking this box will install a flow triggered output onto the irrigation system. Once ticked the output configuration options will be displayed.



Output: Address of output that will be driven on when flow is detected.

Flow Inputs

Any number of flow inputs can be added to the system. Once added each one needs to be configured.

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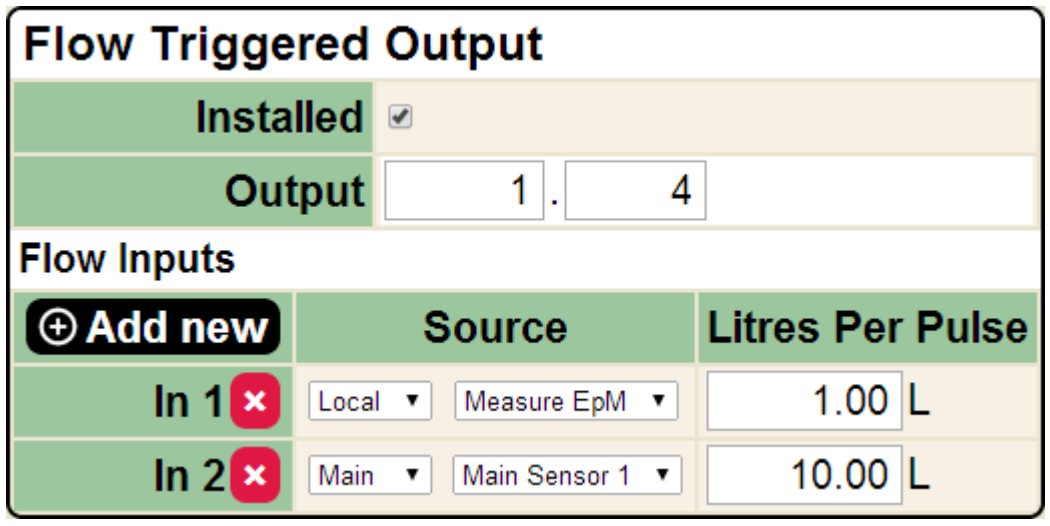
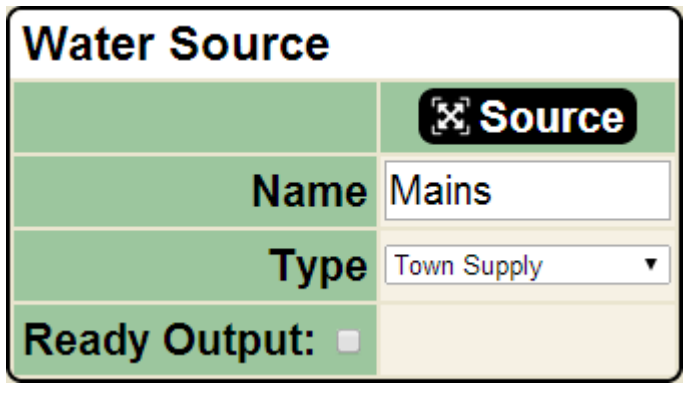


Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
  - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
  - ***Check:*** Flow source is the Check Remote EpM sensor group.
  - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
  - ***Main Sensor 1:*** Flow source is from Main Sensor 1.
  - ***Main Sensor 2:*** Flow source is from Main Sensor 2.
  - ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: Here the flow rate of the desired source is specified, this value should be specified by the manufacturer of the flow meter.

Water Source

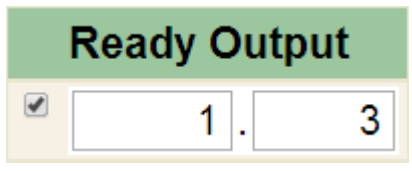


Name: This is a unique name given to the water source useful for identification elsewhere in the system. It is also used for alerting.

Type: Type of water source being used on the system. This can vary depending on individual requirements of the system.

- ***Mains:*** Irrigation system is connected directly to a main water supply.
- ***Tank:*** The irrigation system is feed from a tank. Note this is not the same as a batch tank. If the batch tanks fill input is on the output of another tank then this option should be selected.
- ***Blend Tank:*** This is the same as a normal tank except with the added ability for blending two different fill inputs in order to try and pre-blend the nutrient level of the tank.
- ***Main Tank 1, 2 & 3:*** Main Tanks are identical to normal system tanks but are configured at the site level. This is useful if one tank is to be used across multiple irrigation systems. These are configured outside of an irrigation system, since they are used across multiple systems.

Ready Output: A water source such as a tank may only be ready when it is a certain percentage full, if a ready output is installed this will turn on once the water system has determined it is ready. Note a Town Water source is always ready.



Additional Configuration

Pressing the source button at the top of the box will display additional configuration's for the water source depending on which type of source has been selected.

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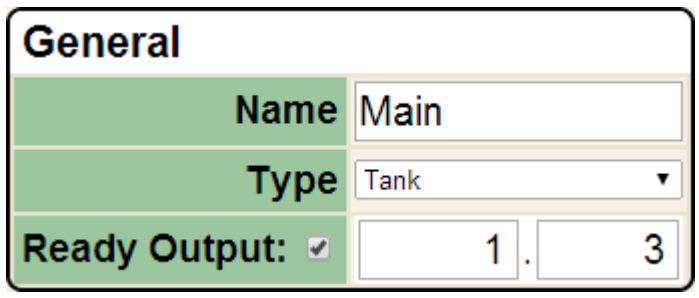
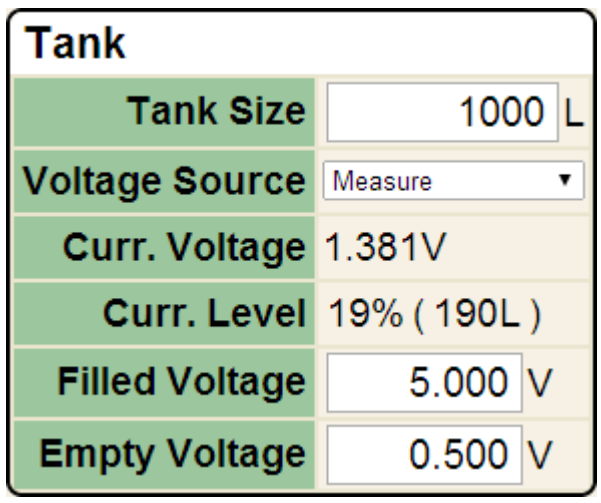
General



The general box displays the same settings as the overview box for the water source. See above for more information of these settings.

Tank



IF the water source is a Tank or a blending tank this box will be displayed here all the information for configuring a tank will be displayed.

Tank Size: Size of the tank being used for batching, this is not crucial to the control of the tank as the voltage readings determine the actual tank level. This is more for user feed back of the tanks exact level.

Voltage Source: The Remote EpM group the tank level sensor is being reported to.

- ***Measure:*** The tank level sensor is connect to a Remote EpM under the Measure Group.
- ***Check:*** The tank level sensor is connect to a Remote EpM under the Check Group.
- ***Source:*** The tank level sensor is connect to a Remote EpM under the Source Group.

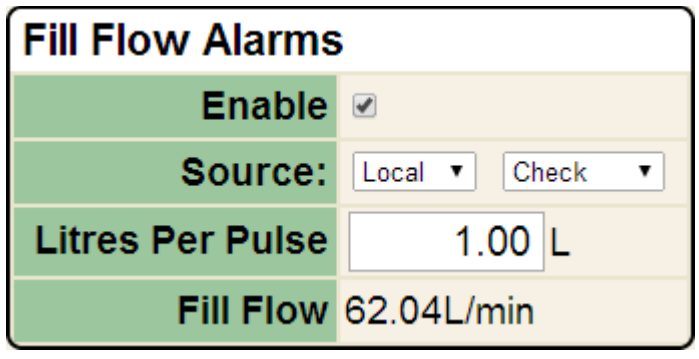
Curr. Voltage: Current voltage on the Moist input of the sensor source selected above.

Curr. Level: Current level calculated from the settings.

Filled Voltage: When the tank is full enter the value being displayed under Curr. Voltage into this field.

Empty Voltage: When the tank is empty enter the value being displayed under Curr. Voltage into this field.

Fill Flow Alarms



IF the water source is a Tank this box will be displayed.

Enable: This box will enable the fill flow alarm on the system. Once ticked and saved additional options will become available.

Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
  - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
  - ***Check:*** Flow source is the Check Remote EpM sensor group.
  - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
  - ***Main Sensor 1:*** Flow source is from Main Sensor 1.

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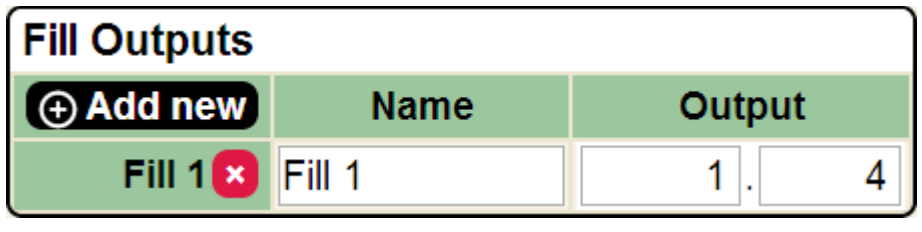
- ***Main Sensor 2:*** Flow source is from Main Sensor 2.
- ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: How many litres is passed through the flow meter before a single pulse is generated, this is specified by the manufacture of the meter.

Fill Flow: Current flow being measured by the configured sensor source.

Fill Outputs

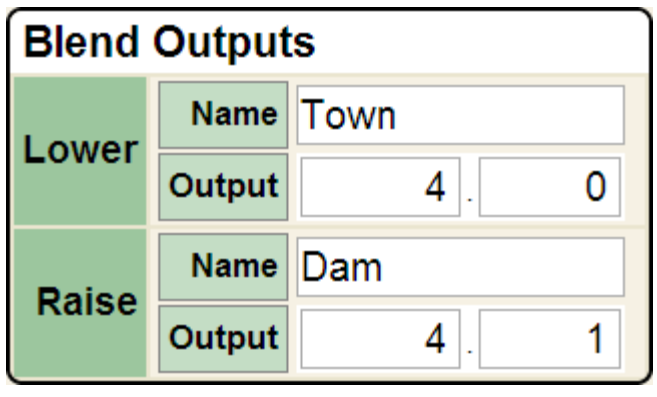


IF the water source is a Tank this box will be displayed. Fill outputs can be added for removed from the tank, a tank can support up to 4 fill outputs.

Name: Name given to the output for identification purposes.

Output: Address of the output the fill valve is physically wired to.

Blend Outputs



IF the water source is configured as a blending tank this box will be displayed.

Lower

The lower output is used to supply water that will effectively lower the nutrient level of the tank, this is usually connected to town water.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

Raise

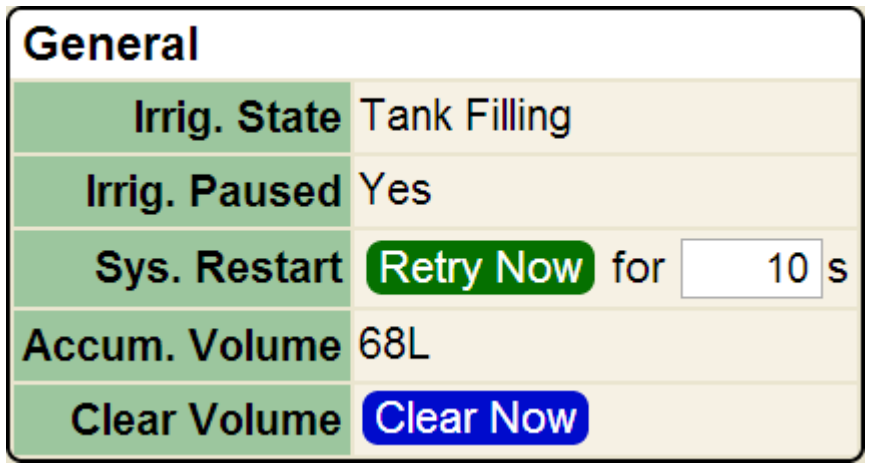
The raise output is used to supply water that will effectively raise the nutrient level of the tank, this is can be connected to a pre-dosed water supply or a Dam the collects run off.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

Settings

General



Irrig. State: Current state of the irrigation system. This can be driven from multiple installed functions

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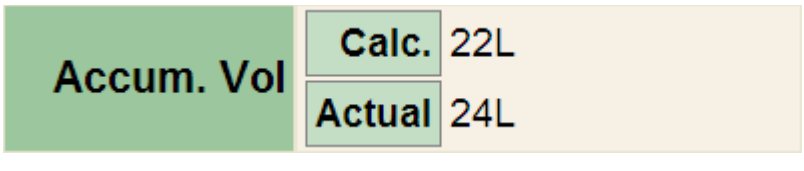
Irrig. Paused: Is the irrigation system currently in a paused state.

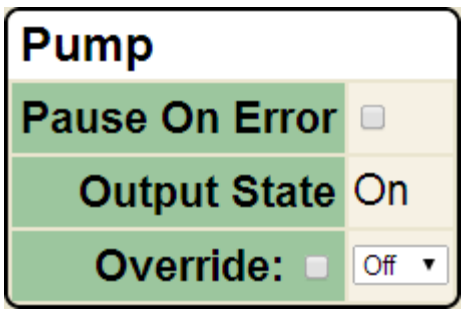
Sys. Restart: If the system is currently paused this box will be displayed, if the irrigation system is in a state in which it might need to be resumed to try and clear this. If a flow error or pump error has occurred the system needs to start running again in order to check if the error conditions have been resolved. Pressing the retry now button will unpause the system and hold it unpaused for the time specified in the box. After this time if an error conditions still exist on the system it will return to the paused state.

Accum. Volume: Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.



Clear Volume: This will immediatelty set the Accumulated volume reading back to zero. This will happen to both the calculated and actual volumes on the system.

Pump



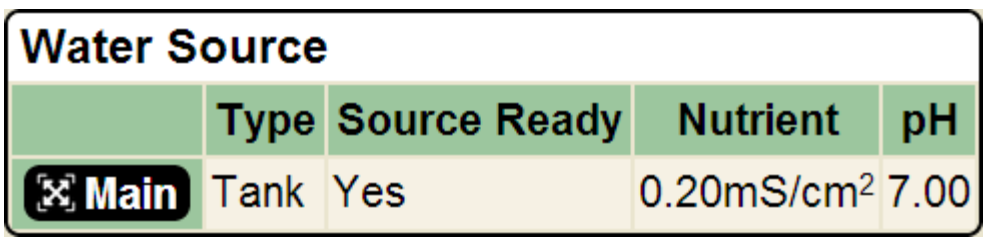
This box will be displayed only if a Main pump has been installed on the configuration page.

Pause On Error: If communications to the output module that controls the pump or the pump switch has been set to manual on this module, an error will be generated by the system. Ticking this box means that when an error like this occurs the system will be paused and stop all irrigation.

Output State: Current state of the pump output.

Override: Ticking this box will override the output to the state specified in the drop down box.

Water Source



Depending on the type of water source configured on the system the additional options displayed on the expanded menu will differ. The common readings are displayed here, pressing the expand button will bring up extra settings boxes.

Type: Current type of water source configured.

Ready: Is the water source ready. Note Town Water sources are always ready.

Nutrient: Current nutrient level of the water source.

pH: Current pH level of the water source.

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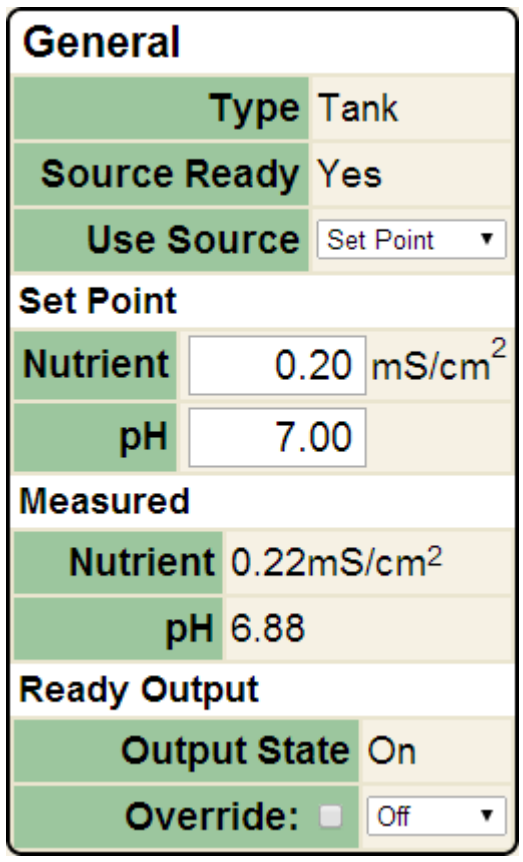
General



The general tab the same for all types of water sources, it is the only options box available for a Town Water and Main Tank source.

Type: Type of water source.

Source Ready: Is the water source currently ready this can be set from a number of places depending on the type configured. For a Tank and Blending tank the locate ready when above is responsible for that, also the failsafe setting. When using main tanks the same settings will drive this value but are based on the main tank ones. A town water source is always ready.

Use Source: Certain dosing alogrithms in the system required a starting point in order to operate correctly. This starting point is the water nutrinet and pH levels. These can be be either from a set point or measured using a Source EpM sensor group.

Set Points

Here both a nutrient and pH source set point can be configured.

Measured

The current nutrient and pH levels being measured from the Source EpM group are displayed here.

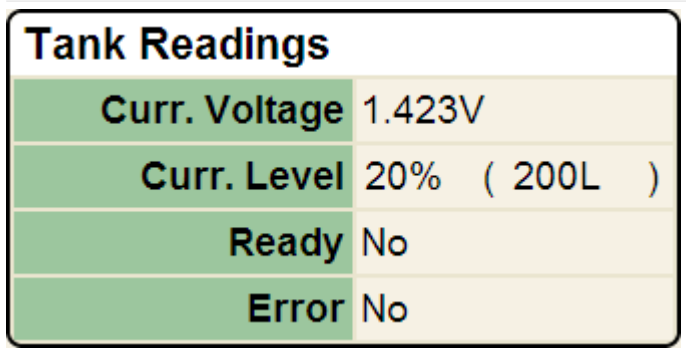
Ready Output

The ready output sub box will only be displayed if a ready output has been configured on the water source.

Output State: Current output state of the ready output.

Override: Ticking this box will override the ready output to the state specified in the drop down box.

Tank Readings



If a water source is configured as a tank or blending tank this reading box will be displayed, it contains the major readings relating to the tank.

Curr. Voltage: Voltage being reported on the Moist input of the sensor selected to be the source for this tank.

Curr. Level: Based on the size and voltage levels configured for this tank the Curr. Voltage level is converted into a percentage full value as well as a approximate litre value.

Ready: is the tank ready.

Error: Is the an error on the tank.

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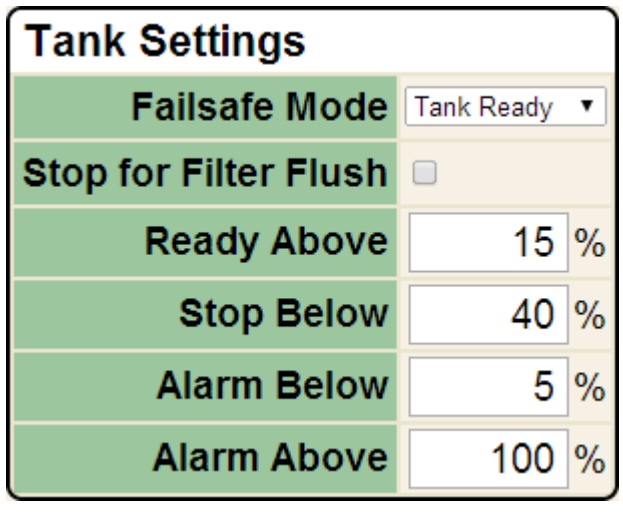
Tank Settings



If a water source is configured as a tank or blending tank this settings box will be displayed, it contains the major settings for a tank.

Failsafe Mode: If the voltage reading is ever lost the system has no idea what level the tank is at, if a water source is not ready the system will not be above to irrigate. Setting this to Ready means that if the voltage level from the sensor is ever lost the tank will instantly become ready, meaning that irrigation can still happen insuring plants can still be watered. If this is set to Delay the system will become paused as the water source will no longer be ready for irrigation's.

Stop for Filter Flush: If a filter flush functionality has been configured on the system it maybe be necessary to stop the tank from filling during this operation. If this box is ticked and a filter flush is started the tank will stop filling operations.

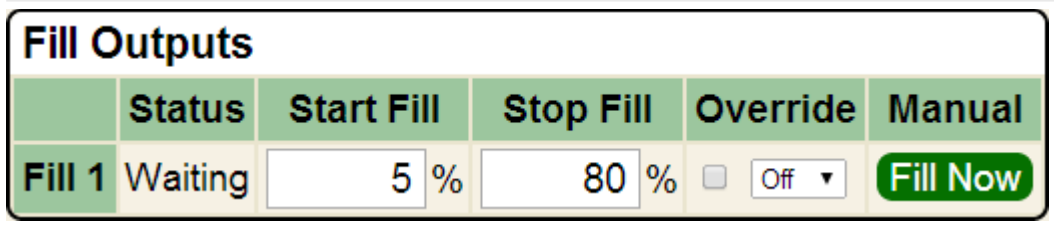
Ready Above: Once the tank has calculated it is at least this full the water source will become ready an irrigation's are allowed.

Stop Below: If the tank ever drops below this level the water source will become unavailable and irrigation's will not be allowed. The different ready and stop levels are used because the tank might usually fill a lot faster than it is irrigated out. This means a tank can be ready sooner and only stop if it drop below a critical level.

Alarm Below: If the tank ever drops below this percentage full an alarm event will be generated by the system.

Alarm Above: If the tank ever goes above this percentage full an alarm event will be generated by the system. If a tank is configured correctly a percentage over 100% should not be possibly if it does the tank configuration might need to be adjusted to insure the reported voltage is converted into a true representation of the fill level.

Fill Outputs



If a water source is configured as a tank type it displayed this setting box.

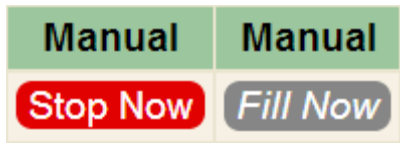
Status: Current status of the fill output.

Start Fill: When the tank level drops below this value the fill output will be turned on.

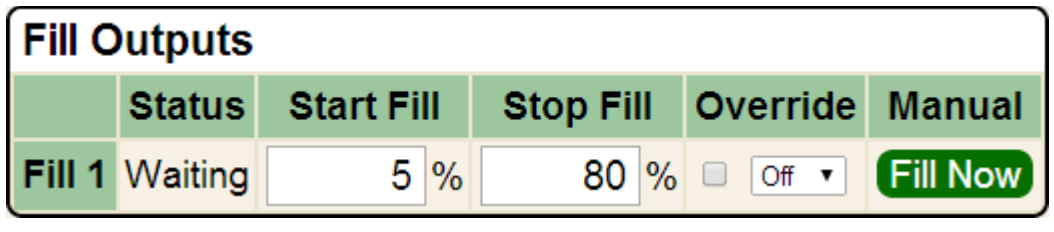
Stop Fill: Once the tank level is above this value the output will be turned off.

Override: Ticking the box will force the output to the state specified in the drop down box.

Manual: When a fill output is in the waiting state it can be manual triggered for filling by Pressing the fill now button, this will turn on the output until the tank level reaches the stop fill level or the Stop Now button is pressed. If the fill output is currently running the stop now button will be displayed. Pressing this button will cause the fill output to turn off until the tank level drops below the start fill level or the Fill Now button is pressed. If an error has occurred in which it is not possible to manual run the output this button will be disabled.



Fill Flow Alarm



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If a water source is configured as a tank type it displayed this setting box.

Fill Flow: Current flow rate being measured on the fill flow sensor configured.

Alarm if: If the tank is currently filling e.i. any fill output is currently on and the flow being measured on the meter drops below the set level for the specified amount of time and alarm conditions has occurred.

Stop Fill on Alarm: Ticking this box means that if the above alarm conditions are meeting all fill outputs will be stop until this is cleared.

Alarm State: Current state of the alarm.

Stop Output: Has the alarm caused the fill outputs to stop. If this is true the fill outputs state will also change to indicated this.

Alarm State	Alarm Stopped
Stop Outputs?	Yes
Clear Stop	Clear Now

Clear Stop: Pressing the clear now will remove the stop conditions placed on the fill outputs by the alarm. The tank will return to normal operation. This button will only appear if an alarm condition has occurred which stopped the outputs from operating. When the alarm conditions arises the fill outputs status will change to indicated this and the manual buttons will be disabled.

Status
Stopped (Alarm)

Blending Control

Blending Control

Mode	Filling
Blend Above	50 %
Desired Nutrient	1.50 mS/cm^2
Deadband	0.50 mS/cm^2

The blending control box will only be displayed if a water source has been configured as a blending tank. The main blending control of the tank is done by the use of a desired nutrient level setting as well as a deadband. The tank also has a blend above setting which is the level the tank must get to before lower and raise outputs can start to be turned off. Below this level the tank is in fill mode where both output will be on in order to fill the tank as fast as possible. Once a tank has reached it blend level it will use the current nutrient level in order to control the outputs. If the current nutrient level drops below the desired level the raise output will be switched on, if the nutrient level reaches a point which is equal to the desired level plus the deadband the raise output will switch off. If the nutrient level is above the desired level the lower output will be switched on, if the level equal the desired level minus the deadband this output will be switched off. This control method means that both output are usually constantly on and will only switch off if extremes are meet. This is because not only are we trying to maintain a desired level of nutrient with in the tank, we are also try to fill it.

Mode: Current mode of the blending tank. If the tank is currently filling both the lower and raise fill output are on this is to give an even mix of both as well as fill the tank as fast as possible. Blending of the two sources only happens when the tank is sufficiently full.

Blend Above: When the tank level has reach a certain level blend of the water sources can occur.

Desired Nutrient: Desired nutrient level of the water source. This is the main setting that controls the lower and raise outputs.

Deadband: The amount the nutrient level must change by before a change in the fill outputs will occur.

Fill Outputs

Fill Outputs

	Name	Status	Override	
Lower	Town	Filling	☐	Off ▾
Raise	Dam	Filling	☐	Off ▾

The blending control box will only be displayed if a water source has been configured as a blending tank.

Lower

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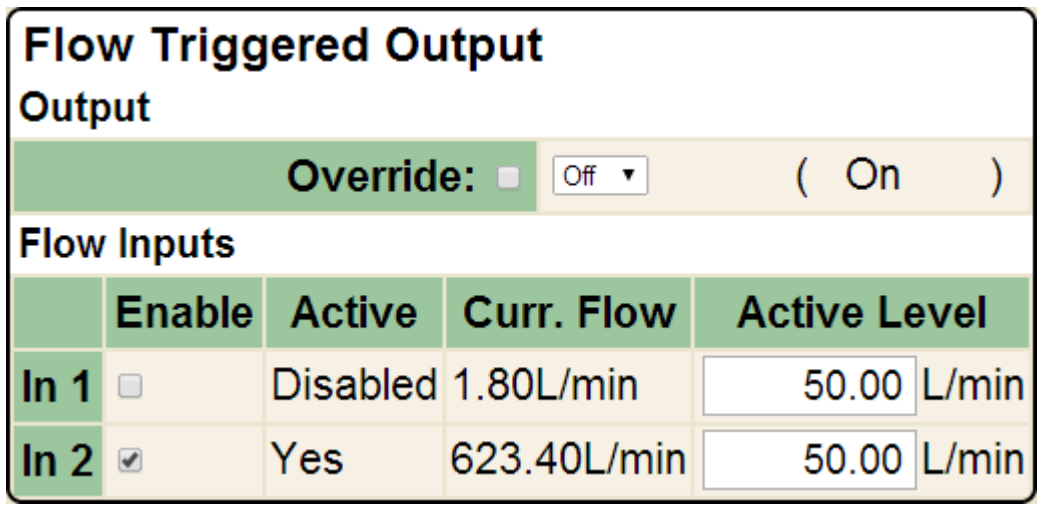
- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Raise

- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Flow Triggered Output



Override: Ticking this box will override the output to the state specified in the drop down box.

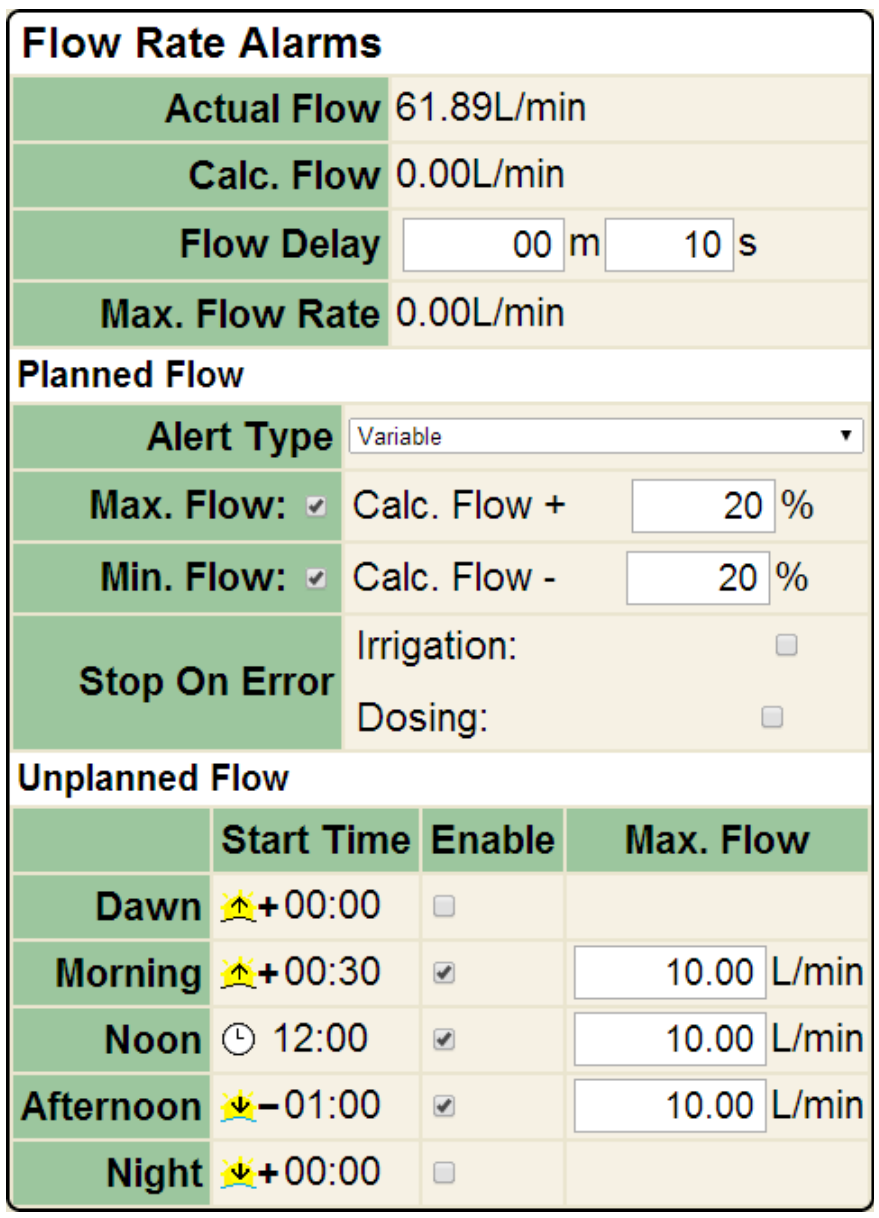
Enable: In order to use a configured flow input as a trigger for this output it must be enabled.

Active: Has the current flow level meet the required level in order to turn on the output.

Curr. Flow Current flow rate being report by the configured input.

Active Level: The level the flow must reach before it is deemed to actually be active and the output to be turned on.

Flow Rate Alarms



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This box will on be visible if the system has a mesaure flow meter properly configured. Though there is a separate alarms tab located on the settings page that is used for generic alarm settings rather than specified levels. An irrigation system has two flow rate alarms that become active under different conditions (Planned and Unplanned).

Actual Flow: Current flow rate being measured by the system.

Calc. Flow: The current flow that should be present on the system derived from the station flow rate settings.

Flow Delay:: When a system begins to water it can take a small amount of time for the pump to spool up. This lag can also happen when the flow is changing due to stations size. This setting lags the measurement by this factor to stop incorrect alarms being generated.

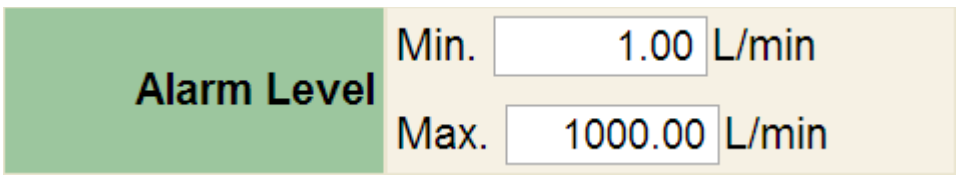
Max. Flow Rate: Current maximum flow rate expected on the system given its current state of operation.

Planned

A Planned flow alarm becomes active when we are expecting flow to be present on the system e.i a irrigation has become active. The system can be configured to generate both minimum and maximum flow rate alarms based on the flow of the system. The flow rate variable configured for each station is compared to the current flow rate being measured if this various by a certain amount an error is said to have occurred and an alarm should be generated. When an event such as this occurs it is possible to stop the Dosing modules on the system if installed and or stop the irrigation completely.

Alert Type: The type of alarm used for planned flow.

- ***Disabled:*** No planned flow alarms will be generated.
- ***Variable:*** The minimum and maximum flow levels vary depending on the calculated flow rate of the system.
  Max. Flow: Ticking this box means that the maximum planned flow rate alarms are enabled on the system. If the actual flow is ever above the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Max level will still be used by this will be set to a range that cannot be reached by a irrigation system.
  Min. Flow: Ticking this box means that the minimum planned flow rate alarms are enabled on the system. If the actual flow is ever below the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Min level will still be used by this will be set to a range that cannot be reached by a irrigation system.
- ***Set Levels:*** The minimum and maximum flow level are fixed and the actual flow rate is compared to these directly.



Min.: Minimum flow rate allowed on the system when irrigating. If the actual flow drops below this for a certain time, generate an alarm.
Max.: Maximum flow rate allowed on the system when irrigating. If the actual flow rate goes above this for a certain time, generate an alarm.

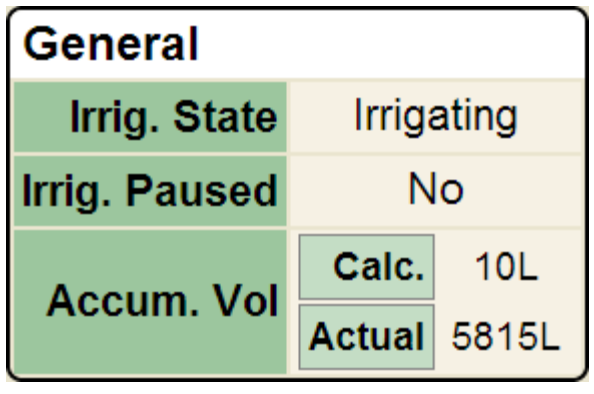
Stop On Error: When an error occurs on the system it is possible to stop either the Dosing Modules or entire irrigation system.

Unplanned Flow

A Unplanned flow alarm becomes active when we are not expecting flow to be present on the system e.i when there is no active irrigation. The system can be configured to enable this alarm per time period. It is also possible to set the level of flow required per time period in order to validate the alarm. If the actual flow rate is above the Max.Flow level for a specific amount of time and it is enabled an alarm will be generated. Note the time period enable needs to be saved in order to see and edit the Max. Flow variable.

Readings

General



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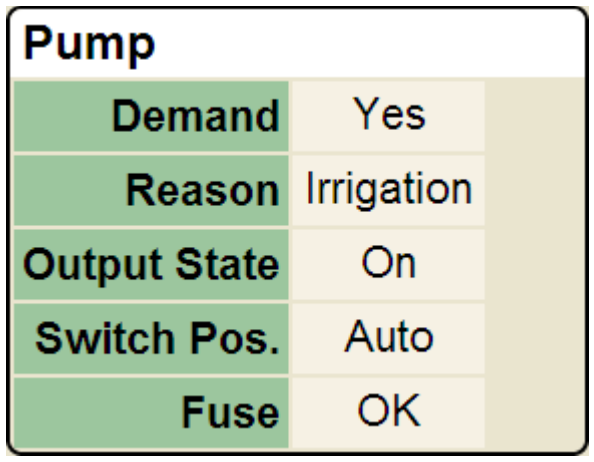
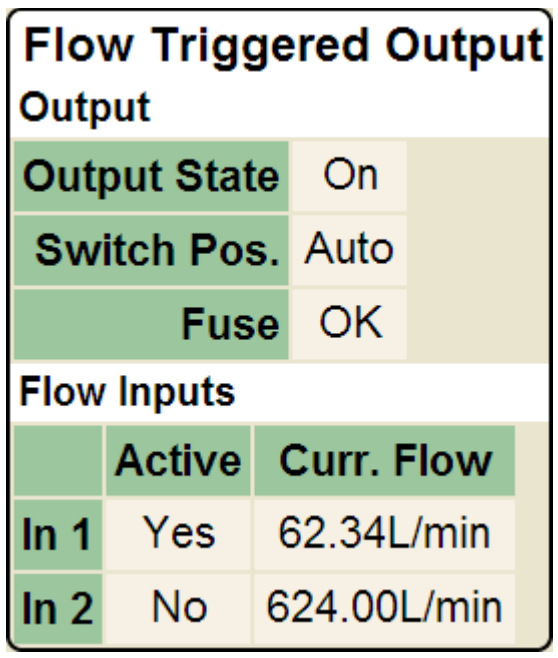
Field	Description
Irrig. State	Current state of the irrigation system. This can be driven from multiple installed functions
Irrig. Paused	Is the irrigation system currently in a paused state.
Accum. Volume	Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.

Pump



Field	Description
Demand	Is there current;y any demand in the system the means the pump should be running.
Reason	This field is only visible when a demand is active there are only a few source that can demand the pump to run, *Irrigation:* an irrigation is active on the system. *Filter:* The run pump on filter flush setting has been selected and the system is currently flushing. *Batch:* The batch system is calling for the pump to be active, this means the run pump while filling or stirring settings have been selected and the batch module is currently performing one of these actions.
Output State	The current state of the output for the pump, *On* or *Off*
Switch Pos	The switch position of the pump output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Flow Triggered Output



Field	Description
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*
Active	Is the configure input sources flow reached the desired level to turn on the output.
Curr. Flow	Current flow being report from the configure sensors for this flow input.

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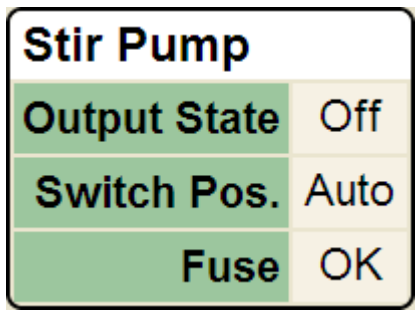
Stir Pump

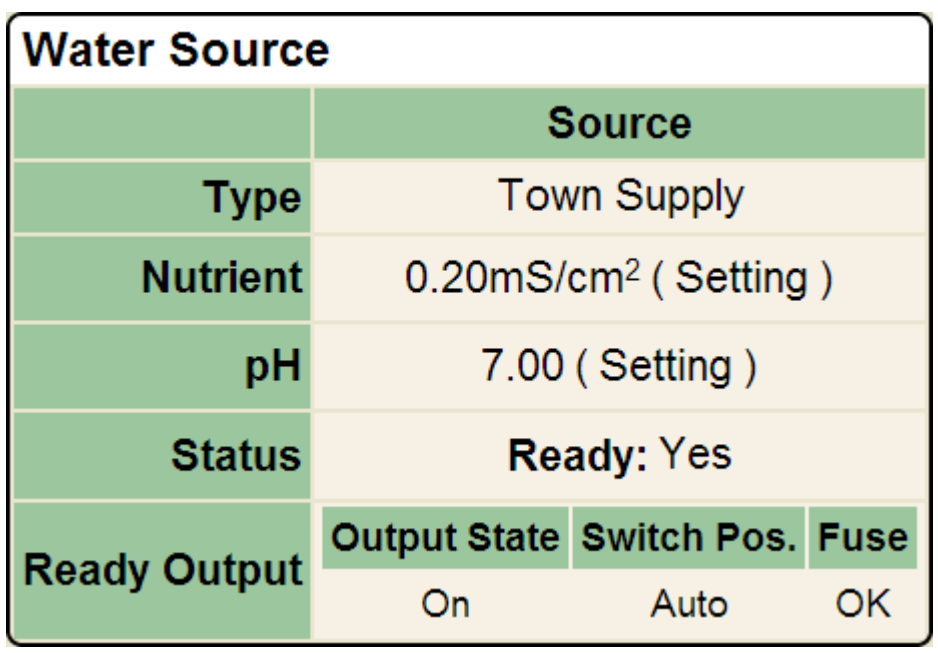


A stir pump can only be configured on an Inline dosing irrigation system and has been properly configured under the Configuration -> Dosing section. It will become active when the system is running an irrigation in order to help stir nutrient and pH injections through the output going water.

Field	Description
Output State	The current state of the output for the stir pump, *On* or *Off*
Switch Pos	The switch position of pump output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Water Source

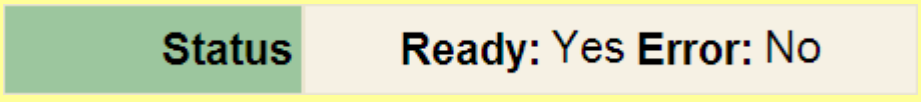
General Readings



Depending on how a water source is configured the displayed information in this box will vary. Above visible readings for a town water source these are common readings among all types of sources.

Field	Description
Type	The current type of the configure water source, *Town Water* , *Tank* , *Blending Tank* or a *Main Tank*.
Nutrient	The current water source nutrient level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
pH	The current water source pH level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
Status	Whether the water source is ready. Note a town water source is always ready.
Ready Output	If a ready output has been installed on the water source the outputs information will become visible here. **Output State** The current state of the output for this injector, *On* or *Off*. **Switch Pos** The switch position of this injectors output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

If a water source has been configured as a tank or blending tank the status box mentioned above will contain a an error reading as well to indicate whether the current tank has an error condition present.



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Tank Readings

Curr. Level	19% (190L)		
Outputs		**Fill 1**	**Fill 2**
	Status	Filling	Filling
	Output State	On	On
	Switch Pos.	Auto	Auto
	Fuse	OK	OK

Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field all the current readings for each fill output configured on tank are displayed. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the output for the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

Blending Tank Readings

Curr. Level	51% (510L)		
Outputs		**Lower**	**Raise**
	Name	Town	Dam
	Status	Running	Running
	Output State	On	On
	Switch Pos.	Auto	Auto
	Fuse	OK	OK

Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field the lower and raise fill output readings are displayed. **Name** Unique identifier given to this output. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

Flow Rate

Flow Rate	
Actual Flow	62.34L/min
Calc. Flow	80.00L/min
Planned Flow	
Enabled	Yes
Min. Flow Rate	64.00L/min
Max. Flow Rate	96.00L/min
Unplanned Flow	
Enabled	No
Max. Flow Rate	10.00L/min

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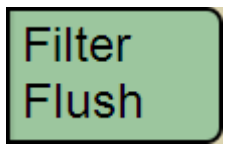
For this box to be visble a flow meter must be correctly installed and configured on the irrigation system.

Field	Description
Actual Flow	Current flow rate being measured from the configure sensor source.
Calc. Flow	Current calculated flow the system is expecting to see based on its current state.
Planned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Min. Flow Rate	The minimum flow the system is allowed to have with generating an alarm condition, this is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Unplanned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on alarm level settings.

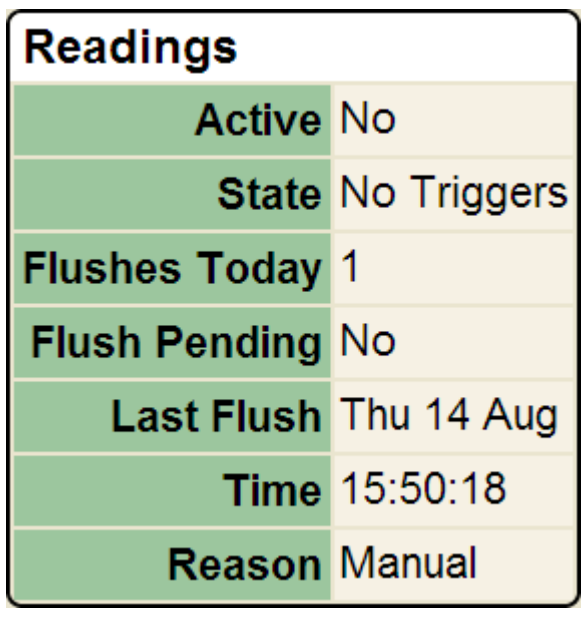
Filter Flush



If a filter flush is installed on the system a separate tab will be appear on the tertiary menu. When a filter flush is occurring the system is running water backwards through the pump. This means that irrigation's will be paused or unable to start during this period.

Settings

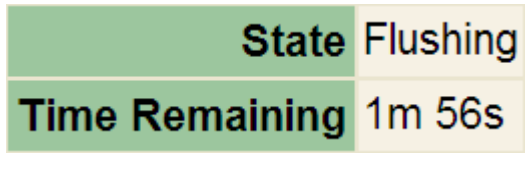
Readings



Active: Is the filter flush currently active.

State: Current state of the filter this can differ from the active reading and reflects other aspects of the filter flush system.

Time Left: Time remaining for the active filter flush cycle, this will only be displayed if the system is currently performing a filter flush.



Flushes Today: Number of flushes that have occurred today since midnight.

Flush Pending: If there is a flush pending the trigger source will be displayed here, a trigger can only be pending if the use of a flush window otherwise flushes will happen whenever they are demanded. If multiple triggers have occurred before the filter flush can run, the sources will be listed here.

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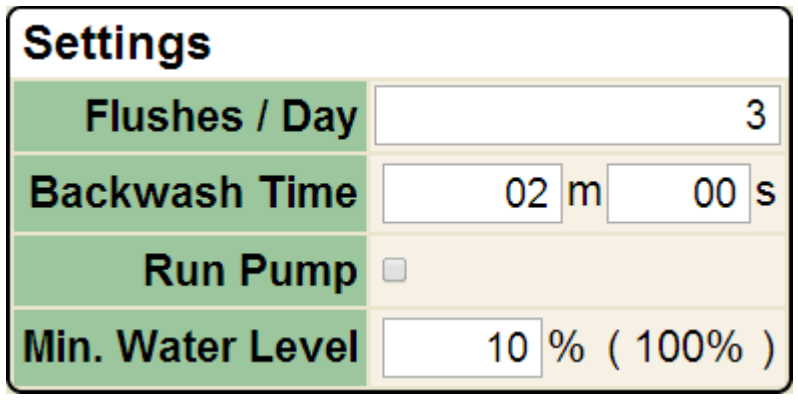
Last Flush: Date of the last filter flush.

Time: Time when the last flush finished.

Reason: the trigger source for the last flush.

Settings



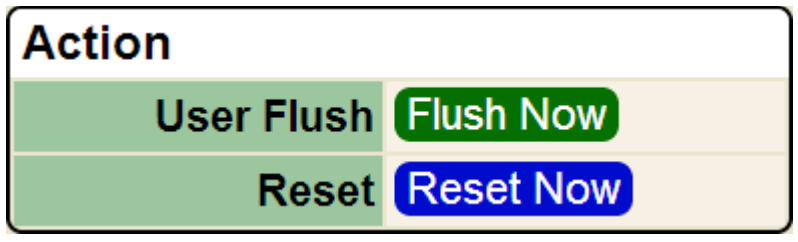
Flushes / Day: This sets the amount of flushes allowed per day, this is a maximum set point that can not be exceeded by any of the flush triggers except for a manual flush.

Backwash Time: The time it takes to run water backwards through the filter in order to flush it properly. This is time is sometime giving by the filter manufacturer. It may also be specified as a volume.

Run Pump: If this box is ticked when a filter flush becomes active the main system pump will also be turned on.

Min. Water Level: If a tank is the source water for the flush it might required more water then what is currently in the tank. Using this value it is possible to specify the amount of water that must be present from the water source in order to run a flush, otherwise it will not happen.

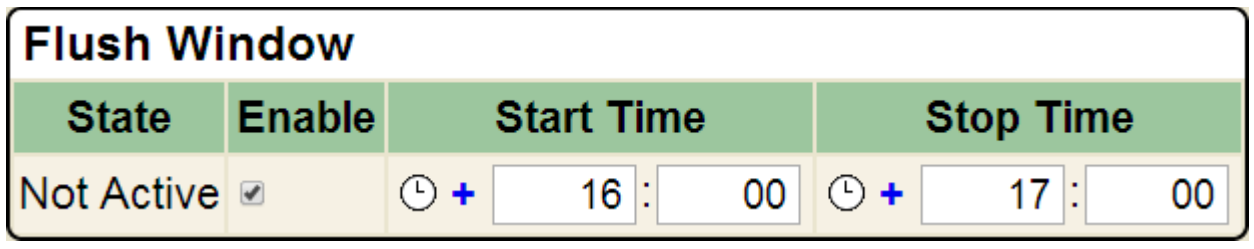
Action



User Flush: Triggers an immediate filter flush regardless of the state, once a filter flush has been activated this button will change to a cancel button, which will immediately stop the active filter flush.

Reset: Pressing the reset button will reset all automated triggers back to zero.

Flush Window



The flush window enables a set time of day for automatic flushes to occur. If a window is enabled the volume and interval triggers can only run between the time specified.

State: Current state of the window.

Enable: If a flush window is to be used on the system this value must be ticked.

Start Time: Time when the window starts, this can be a set time or an offset from sunrise/sunset.

Stop Time: Time when the window ends, this can be a set time or an offset from sunrise/sunset.

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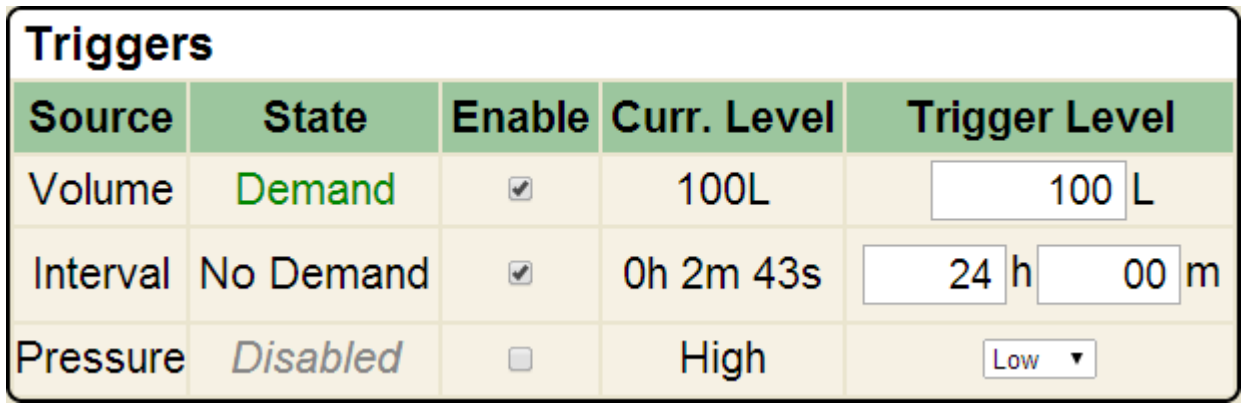
Triggers



There are three sources that can trigger a filter flush within an irrigation system. Both the Volume (actual only) and Pressure triggers required sensor input, if they are not installed a No Sensor error message will be displayed. The Volume and Interval triggers are bound by the flush window, so will only trigger during the window if enabled. All the triggers are also bound the number of flushes per today as well as the water source level. If any of these conditions are not meet but a trigger is demanded a Demand message will be disabled. Once a flush has completed the current levels will be reset, except for the pressure level since that is driven directly from a sensor. If any of the triggers are *Disabled* they will not be able to trigger.

Volume
A volume triggered filter flush is driven from either the calculated or measured volume on the system. If the measured volume is being used a flow meter must be correctly configured on the system.

Interval:
This is a simple time based triggered once a certain amount of time has passed since the last filter flush a new trigger will be generated.

Pressure
This is driven directly from a pressure sensor installed onto an EpM sensor within the system, this must be properly configured for this trigger to work.

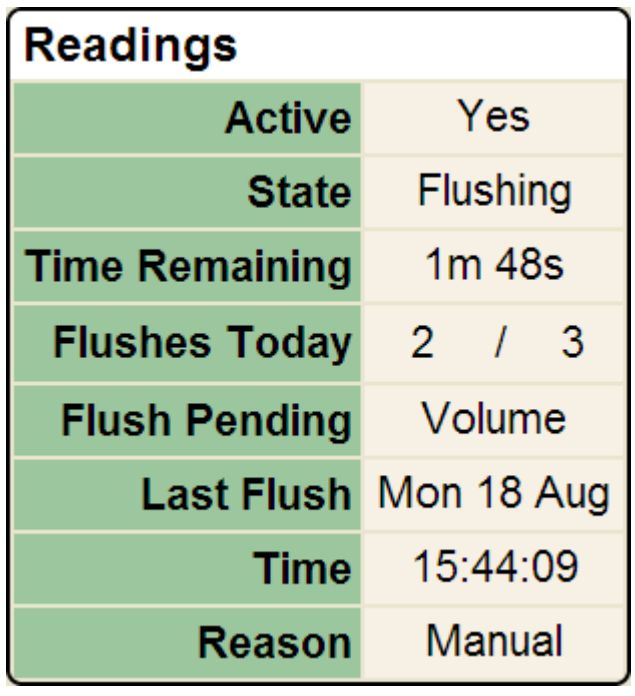
State: Current state of the trigger.

Enable: This box must be ticked if the source is to be used as a trigger.

Curr. Level: Current reading of the source.

Trigger Level: Level the source reading is compared to in order to generate a trigger.

Readings



Field	Description
Active	Is a filter flush currently being performed by the system
State	Current state of the filter flush module.
Time Remaining	This reading will only be displayed if a filter flush is currently active on the system. It displays how long is left until the flush cycle has completed. This is reset to zero when the system reaches its end of day.
Flushes Today	Number of flushes that have occurred today out of the maximum total allowed.
Pending Flushes	If a flush window has been configured on the system or the number of flushes has been exceeded any triggers will be queued until it will be allowed to run again. The source of this queued flush will be displayed here.
Last Flush	Date of last flush performed by the system.

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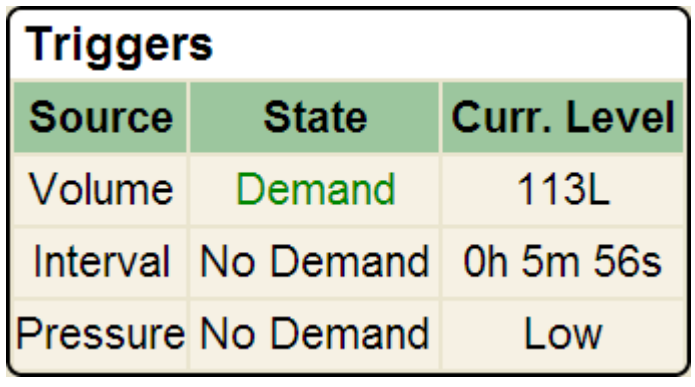
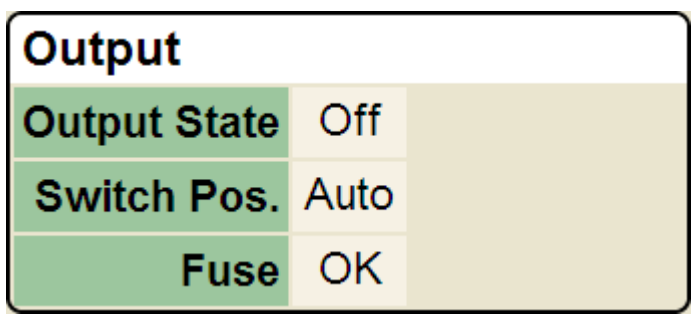
Field	Description
Time	Time of the day the flush occurred.
Reason	The trigger reason for this flush.

Triggers



Field	Description
Volume	State of the volume trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Volume	State of the interval trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Pressure	State of the pressure trigger on the filter flush module, this will only be displayed if the pressure trigger has been correctly set up on the water system configuration page. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level is driven directly from a sensor input and will only change based on physical feedback from the pressure sensor.

Outputs



Field	Description
Output State	The current state of the filter flush output, *On* or *Off*
Switch Pos	The switch position of the output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Sensors

Each irrigation system can have a three different groups of sensors used for ob

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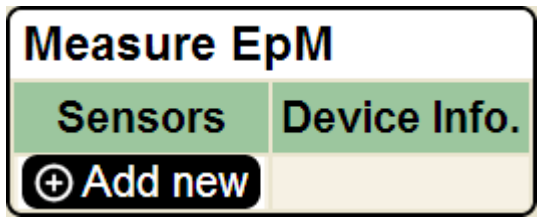
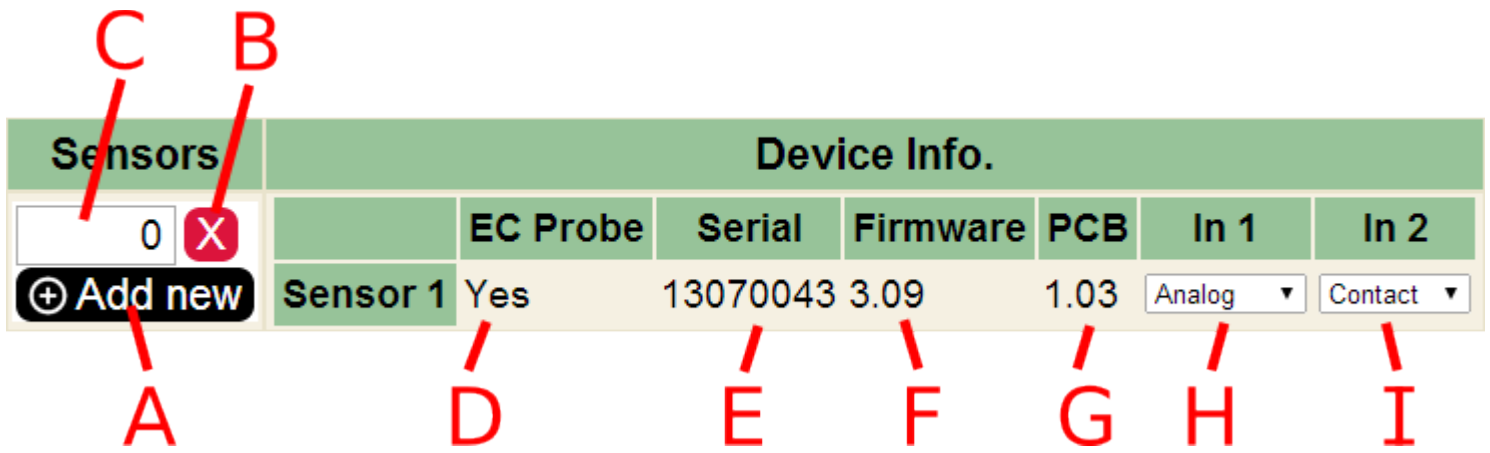
Configuration

Measure EpM



This is the group of readings designated for the main readings of the system. This group reports the Main Nutrient, pH and Flow for the system.

After adding a new Remote EpM to the sensor box the Sensors field and the device info. box will change.

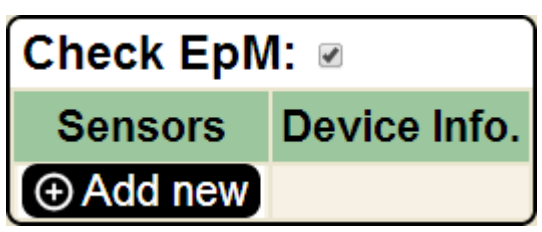


Annotation	Name	Description
A	**Add new button**	Adds an EPM sensor
B	**Delete button**	Deletes an EPM sensor
C	**Sensor address**	The address of the sensor. Each box must be populated with the corresponding address of the EpM device
D	**EC Probe**	Does the Remote EpM currently have an EC Prove attached?
E	**Serial**	Serial number of the device connected under that address
F	**Firmware**	Current version of the firmware this device is running
G	**PCB**	PCB version of the device
H	**In1**	• **Contact:** Input 1 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to 5 - 10V when contact is made • **Analog:** Analog voltage is connected to input 1 of sensor • **Moisture:** Moisture probe is connected to Input 1 of sensor
I	**In2**	• **Contact:** Input 2 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to ground when contact is made • **Flow:** Input 2 is a flow meter input, again this should be pulled to ground when contact is made for correct operation

> Sensor information is only available once the configuration has been activated by pushing the **Activate** button

Check EpM

The Check EpM group is used for mainly error checking against the Measure EpM reading. It can also provided general contact closure inputs as well as analog inputs.



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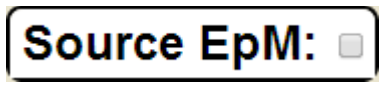
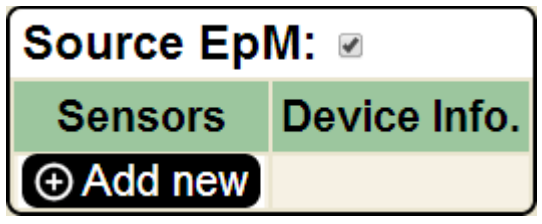
Check EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Source EpM

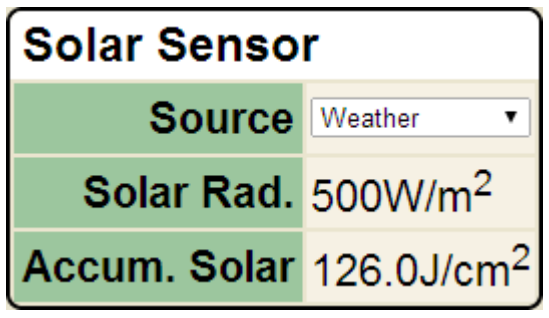


The Source EpM group is mainly used for input information to the system. I can be used to measure the incoming nutrinet and pH level of the systems water supply. It can also provided general contact closure inputs as well as analog inputs.



Source EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Solar Sensor



An irrigation system can have a solar source assigned to it which can be used through the system.

Source: Here the solar source can be specified, depending on which source is selected additional configuration options will be displayed.

- ***Weather:*** The systems solar information will be taking from the weather station.

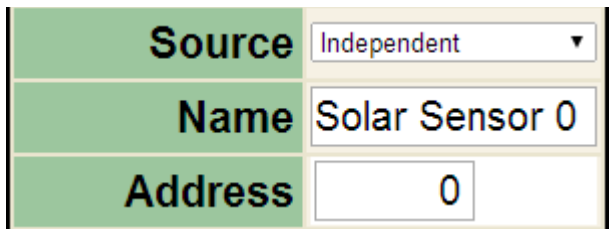
  > A Weather stations needs to be installed and properly configured for this option to be used correctly. See section config weather for information on this.

- ***Independent:*** The system uses the solar reading from a independent solar sensor.
- ***Compartment:*** The system will use the solar information from a specific compartment.

Solar Rad.: Current level of solar radiation that is being measured by the selected source.

Accum. Solar: Accumulated solar radiation since last End of Day.

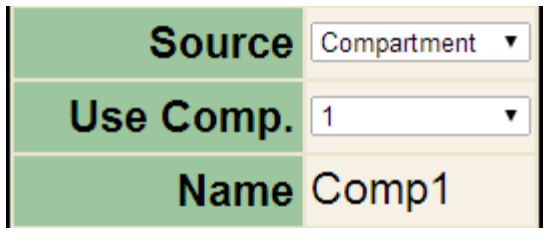
Independent Solar Source



Name: Text can be entered in this field to help identify the solar sensor attached to the system.

Address: The address of the rotary switch the desired solar sensor is set to.

Compartment Solar Source



Use Comp.: The number of the compartment that is to be used be system in order to get solar information must be entered here. In order to use a compartment as a solar source the compartment must be probably configured see configuring climate section for information on this.

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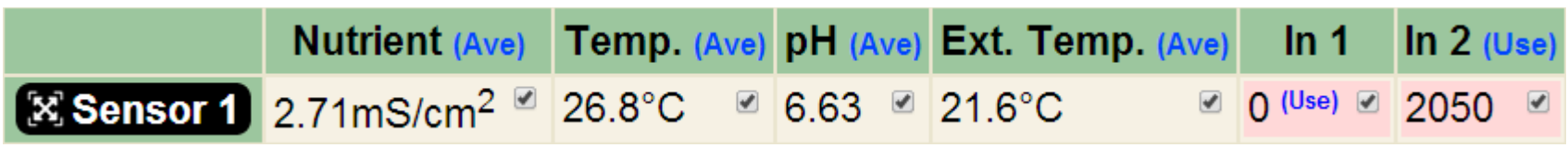
Name: Each compartment can be configured to have a name, this will be displayed here to help ensure the correct compartment has been selected as the solar source.

Overview



The black button that appears in the row heading of the table is an expansion button, this button is given the name of the sensor number added to the system. When this button is pushed additional settings for each sensor will be displayed.

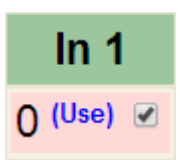
Field	Description
Nutrient	The current nutrient reading from the sensors. If this reading is 0.00 or XX check the connection of the EC probe to the Remote EpM sensors.
Temp.	Each Autogrow EC probe contains a temperature sensors which temperature is displayed here.
pH	Current pH being measured by the probe. Note that due to the nature of a pH measurement even without a probe connected a value can be displayed here.
Ext. Temp.	Current temperature being measured using the pipe temp sensor wired into the Temp pin of the Sensors B Connector. If a probe is not installed this temperature will appear of XX if a sensor is installed and XX is being displayed check the wiring of the probe.

In 1 & 2 Values

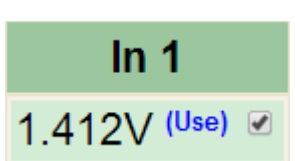
The values displayed in the Input 1 & Input 2 space will differ based on the In 1 setting on the configurations page, this needs to be set correctly to match the desired input signal. Since the type of variable can differ with the same column in the table each specific type of reading will be displayed in a different colour within the cell.

In 1:

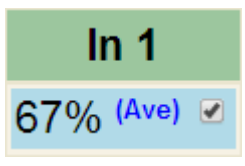
- **CC Count 1:** Current count to contact closure input wired into Moist pin on connector B, the Contact options must be selected under configuration for this to be displayed.



- **Analog:** Current analog voltage being measured by the sensor. This will only be displayed if the sensors In1 value on the configuration page is set to Analog.

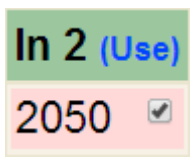


- **Moisture:** Current moisture level being measured by the sensors, the moisture option must be selected under configuration for this to be displayed.



In 2:

- **CC Count2:** Current count of the CC input on the senosrs, this will only be displayed when contact option is selected under the In2 setting on the configuration page.



- **Flow Rate:** The raw flow rate in Hertz (frequency) that is being measured on the sensors. This is in relation to how many pulses a second the sensors is receiving (1 Pulse a second = 1 Hz). The Flow rate option must be selected under the In 2 setting on the configuration page for this to be displayed.

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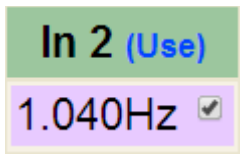


Some or all of the above values are Average Vars.

The addition of the above text and tick box means a variable is part of an averaged set. If the tick box is ticked this means the current reading and all other tick ones will be averaged together. This is useful in order to gain on overall sample of a particular reading. Any invalid readings (e.g. *XX°C*) are omitted from the average even if the box is ticked.

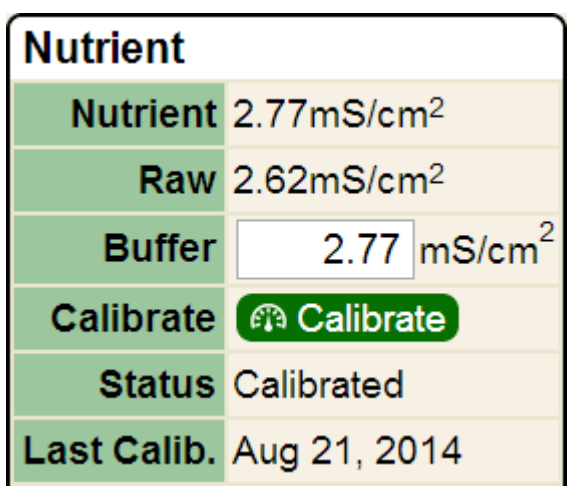
Some or all of the above values are Use Me Vars.

The addition of the above text and tick box means a variable is part of an use me set. If the tick box is ticked this means the current reading will be used as the main reading from the group of sensors. This is useful when multiple sensors within a single group are installed but only one is used for the specific reading. If multiple of the same use me vars are ticked, the system will use the value from the lowest sensor number as the reading (e.g. *Sensor 0 RH* will be used over *Sensor 1 RH*).

Additional Options

Each sensor can be individually calibrated in order to achieve the most accurate readings. Pressing the See All button will return you to the sensors overview page where other sensors additional options can be navigated to.

Nutrient



Field	Description
Nutrient	Current value of the nutrient, this is the value after the reading has been passed through the calibration it is the one that will be added to the average.
Raw	This is the raw reading coming from the sensor before calibration. This can differ from calibrated reading by quiet a lot. This value is displayed in order to give an indication of whether a new calibration should be performed.
Buffer	This is the calibration solution being used, default is 2.77mS/cm^2. This value can be changed to any value of buffer solution.
Calibrate	Pressing the Calibrate button will calibrate the current nutrient reading to the buffer solution set.
Calib	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Nutrient Calibration Procedure

For each Remote EpM sensor within a group that is to be used for nutrient measurement it is recommended to calibrate the probes once a month.

- Clean & rinse the nutrient probe face
- Place the probe into the calibration solution.

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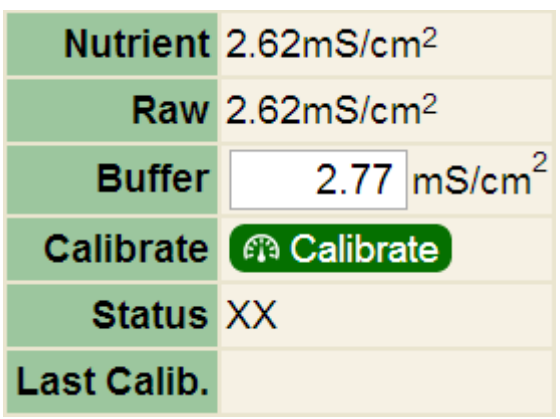
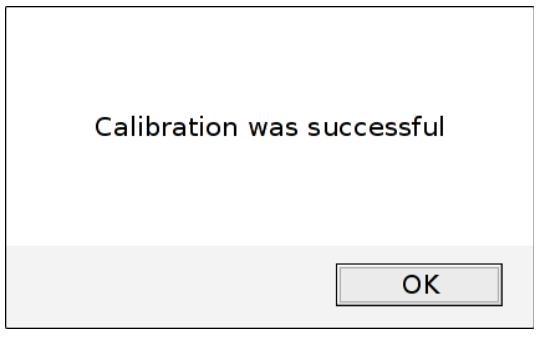
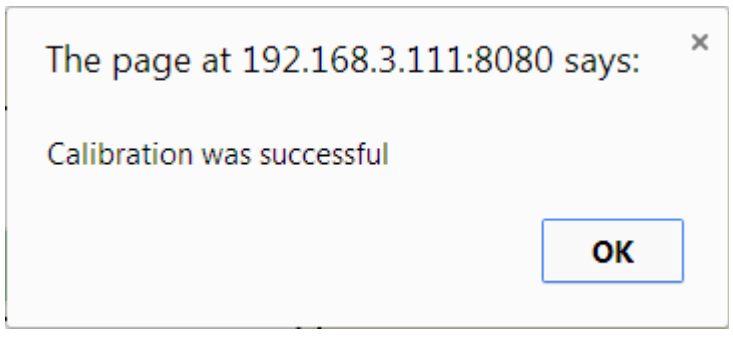
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

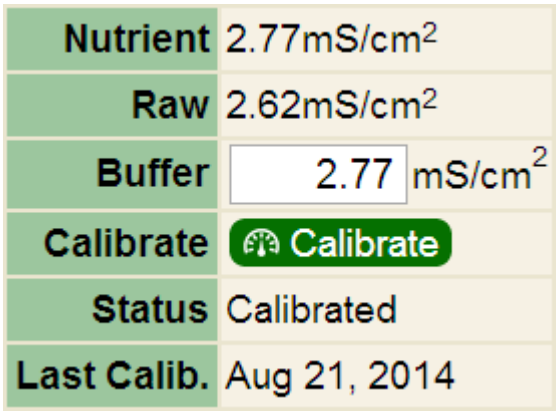


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the nutrient and the temperature to stabilize (Recommended 5 Minutes).



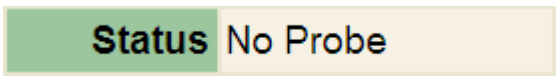


- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

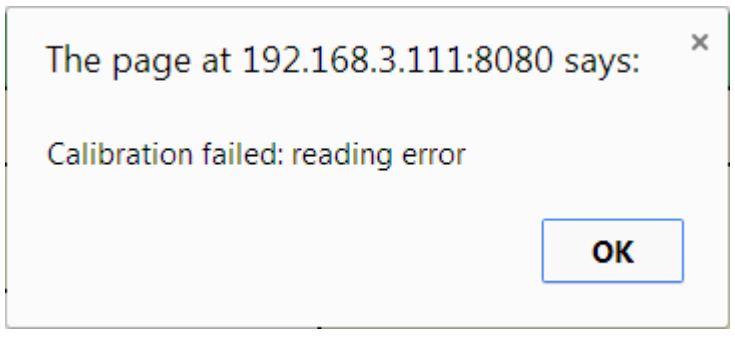


Calibration Errors

- **No Probe**



No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.



- **Out of Range**

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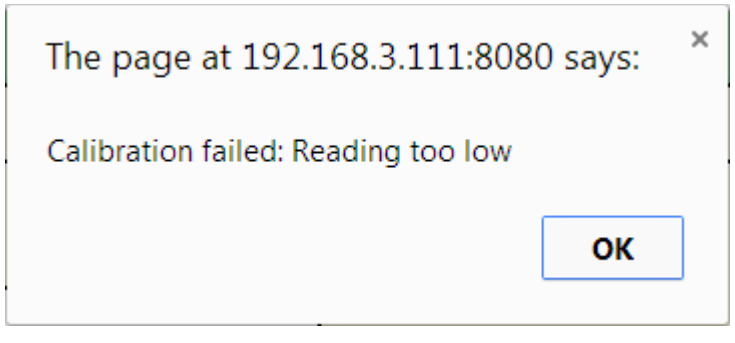
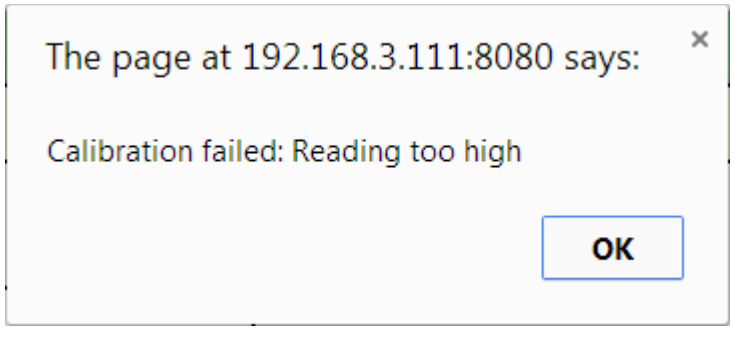
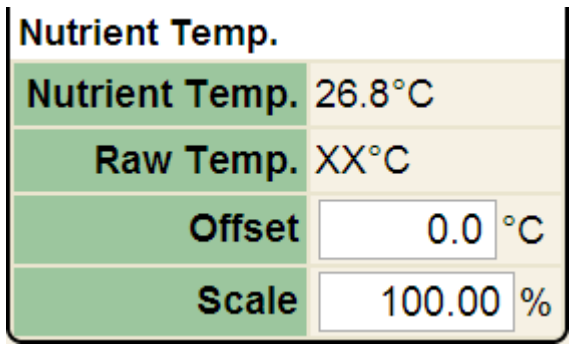
Status	Out of Buffer Range

Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.



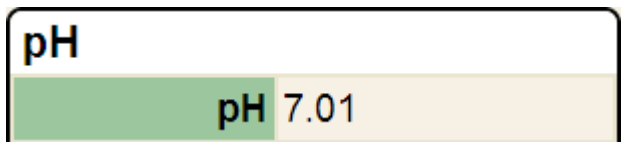


Nutrient Temperature



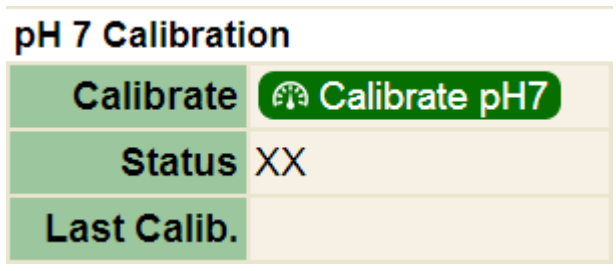
Field	Description
Nutrient Temp.	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

pH



Field	Description
pH	Current pH value being reported by sensor.

Buffer 1 pH 7



Field	Description
Calibrate	Pressing this button will start a pH7 calibration.
Status	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Buffer 2 (pH4)

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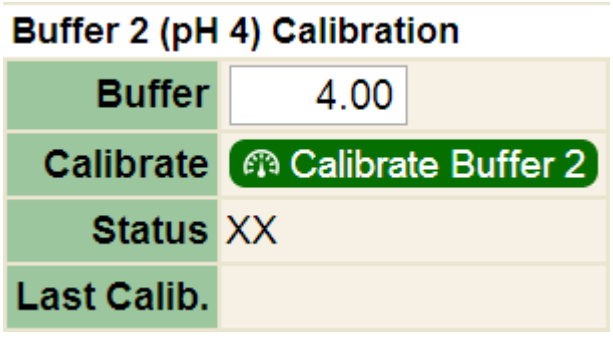
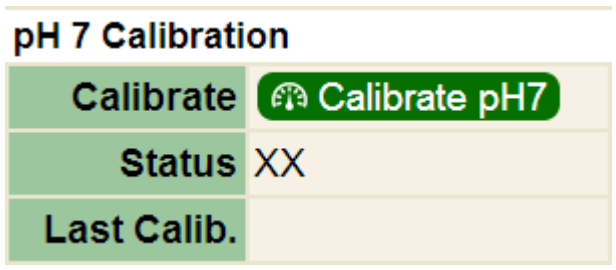


Field	Description
Buffer	pH value of the second buffer used in the pH calibration, this is usually a pH buffer of 4 but can be any other different pH level solution.
Calibrate	Pressing this button will start the second buffer calibration.
Status	Displays calibration information about the sensor.
Last Calib	Display the last calibration date for the sensor.

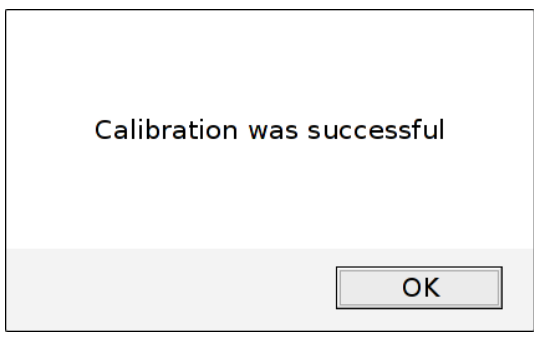
pH Calibration Procedure

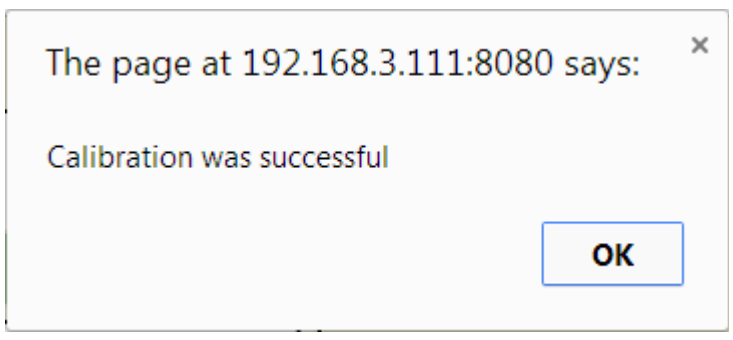
For each Remote EpM sensor within a group that is to be used for pH measurement it is recommended to calibrate the probes once a week to compensate for aging electrodes.

- Rinse the pH Electrode in fresh water.
- Place the probe into the pH 7 calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

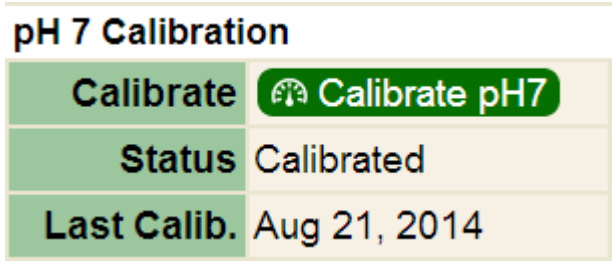


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).





- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- Press the activate button before moving on to the second point calibration (pH 4).
- After a successful calibration the Calib message and time will be updated.



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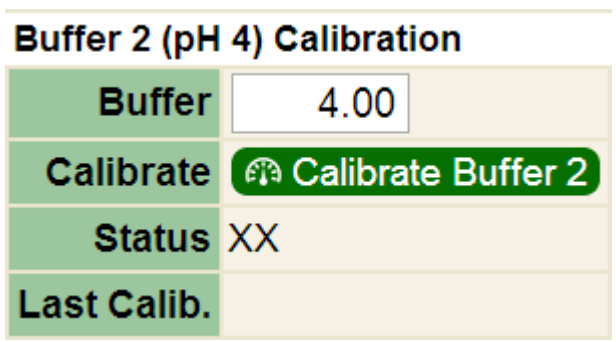
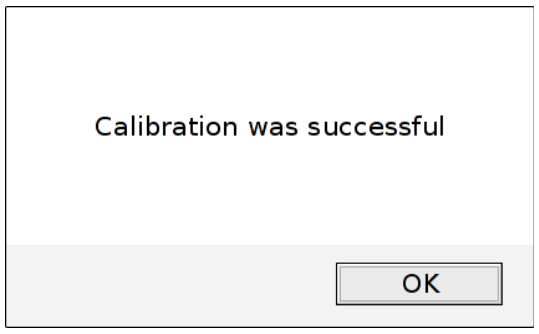
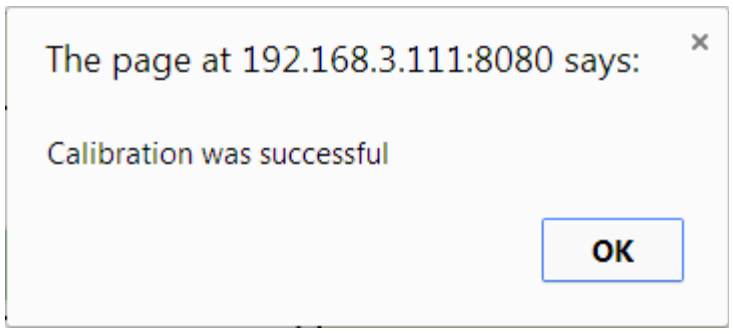
- Rinse the pH Electrode in fresh water.
- Place the probe into the second (pH 4) calibration solution.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

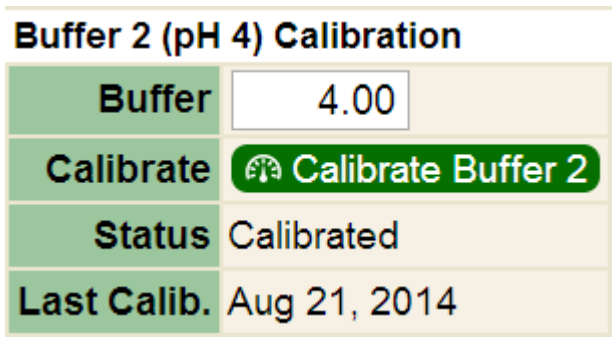


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).



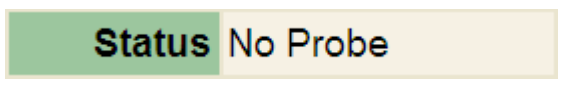


- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

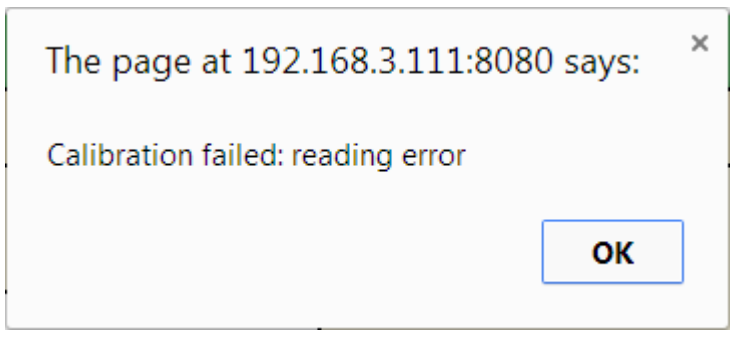


Calibration Errors

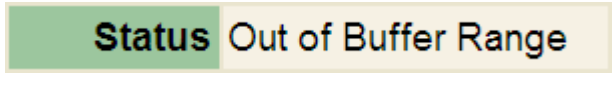
- **No Probe**



No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.



- **Out of Range**



Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to

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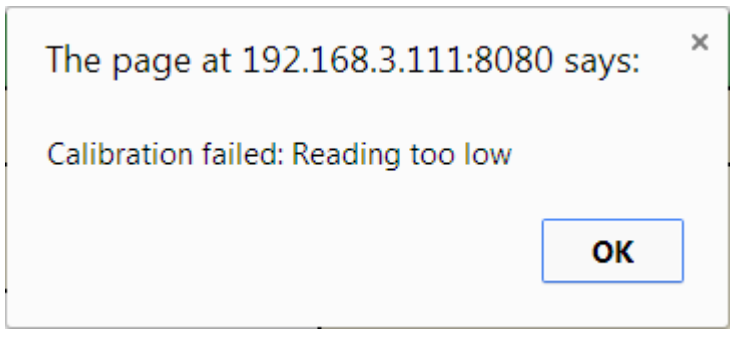
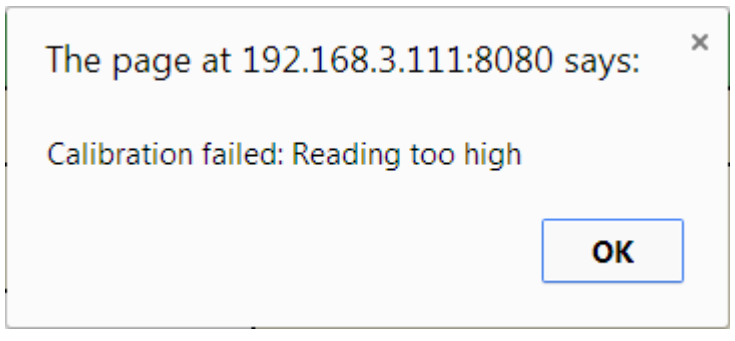
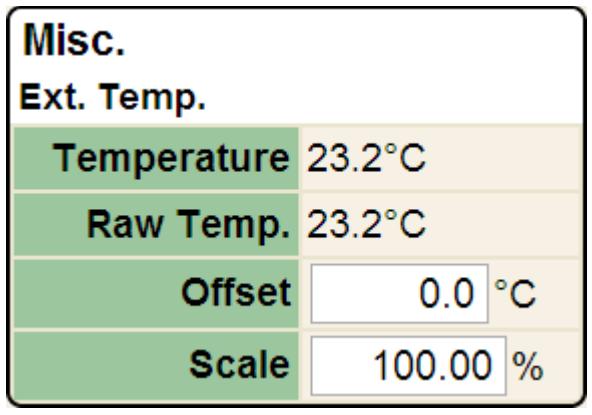
calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.





Misc.

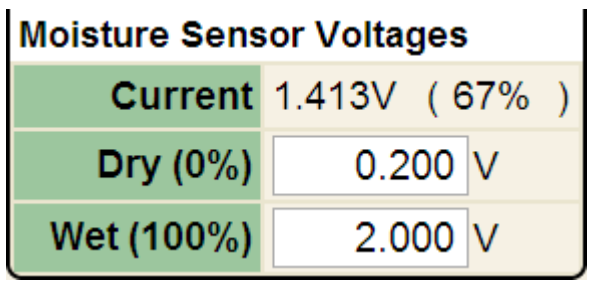
External Temperature



Field	Description
Temperature	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

Moisture

The moisture probe options box will only appear if the input 1 type has been selected under the configuration page.



Field	Description
Current	Current voltage being measured by sensors from the moisture probe.
Dry (0%)	Voltage when probe is completely dry.
Wet (100%)	Voltage when probe is completely wet.

Moisture Probe Calibration Procedure

For each Remote EpM sensor within a group that is to be used for moisutre measurement it is recommended to calibrate the probes before using them, this usually only needs to be done once for a probe.

- First make sure the probe is completely dry.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate. And navigate to the Moisture Sensor Voltages box, note this will only be visible if the Input 1 type has been set to Moisture on the configuration page.

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Current	0.123V (0%)
Dry (0%)	0.200 V
Wet (100%)	1.000 V

- Set the Dry setting value to match the current voltage being read from the sensor.

Current	0.123V (0%)
Dry (0%)	0.123 V
Wet (100%)	1.000 V

- Place the probe in to a glass of water, this is to ensure 100% wet of the probe for accurate calibration.
- Set the Wet setting value to match the current voltage being read from the sensor.

Current	1.393V (100%)
Dry (0%)	0.123 V
Wet (100%)	1.393 V

- Once these two settings have been enter, save and activate the settings to complete the calibration.
- Once completed the probe can be placed into desired media for normal operation.

Current	0.564V (35%)
Dry (0%)	0.123 V
Wet (100%)	1.393 V

Use Factory Defaults

Use Factory Defaults	
Reset	Reset Now
Clear CC 1 Count	Clear Now
Clear CC 2 Count	Clear Now

Field	Description
Reset	Pressing this button will reset all calibration constants for Nutrient and pH. This button will not effect the offset and scale settings.
Clear CC 1 Count	Manually reset the contact closure count of Input 1 back to zero.
Clear CC 2 Count	Manually reset the contact closure count of Input 2 back to zero.

Averages

Averages *Tick Box to Add Reading to Average*	
Nutrient	2.71mS/cm^2 ☑
Nutrient Temp.	26.8°C ☑
pH	6.63 ☑
Ext. Temp.	21.6°C ☑
Moisture	67% ☑

This box lists all values that are supplied by a Remote EpM senosrs that can be averaged together. This will display variables even if they are not

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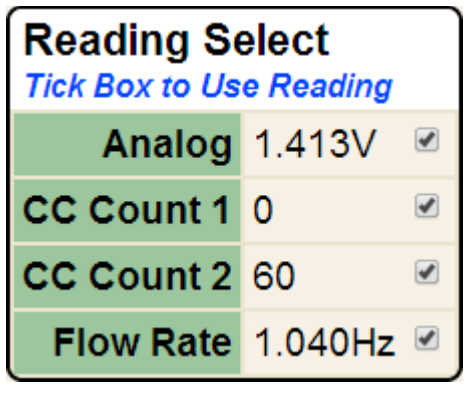
selected as an input on the configuration page.

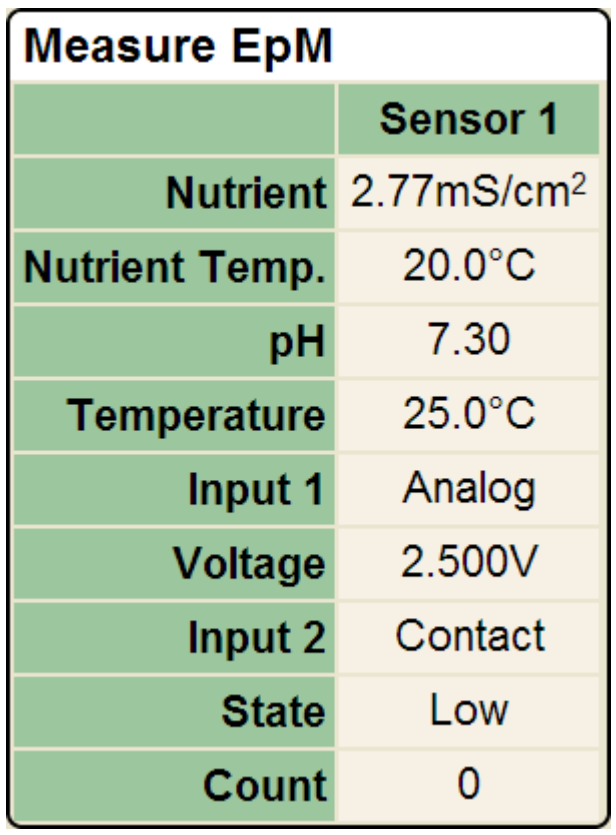
Reading Select



This box lists all values that are supplied by a Remote EpM senosrs that can be select to be used as the main reading out of the set. This will display variables even if they are not selected as an input on the configuration page.

Readings

EpM Sensor's



The above field displays the readings for every sensor within the Measure EpM group. All the readings from each sensor and each group are the same as pictured above, this includes the Check and Source EpM groups.

Field	Description
Nutrient	The current nutrient reading from the sensor if this is every 0.00mS/cm&sub2 check the probe. A reading this low should not be possible if the probe is in water. A reading of this suggest the probe is no longer submerged in water.
Nutrient Temp.	Current temperature of the water the probe is submerged in. Note due to the nature of the material the probe is made from the thermal conductance of the probe is rather low, this means a change in temperature of the water may take a while to effect the actual temperature displayed here.
pH	Current pH level of the water.
Temperature	The temperature of the Stainless steel External temperature probe wired into the sensor this will appear as XX if not connected or an error has occurred.
Input 1	What the current input wired into the Analog input pin of the sensor is, this will only effect what is displayed in the box below.
Voltage / Moisture / Count	Depending on how Input 1 is configure the variable here will be listed accordingly. *Voltage* Current voltage on the input pin. *Moisture* Current moisture in percentage based on the sensor settings. *Count* Current count of the input pin.
Input 2	What the current input wired into the CC input pin of the sensor is, this will only effect what is displayed in the box below.
Count / Flow	Depending on how Input 2 is configure the variable here will be listed accordingly. *Count* Current count of the input pin. *Flow* Current calculated flow rate based on the frequency being supplied by the input.

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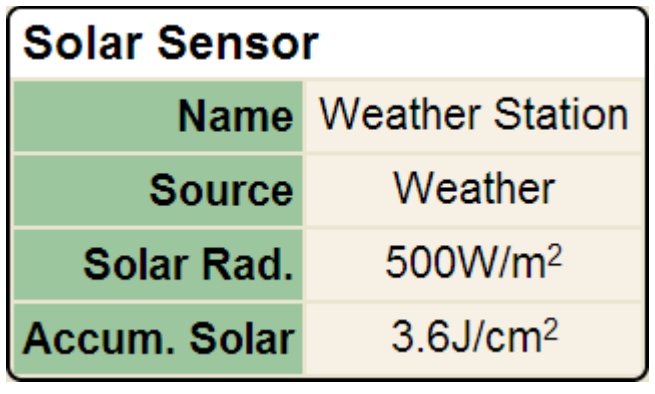
Solar Sensor

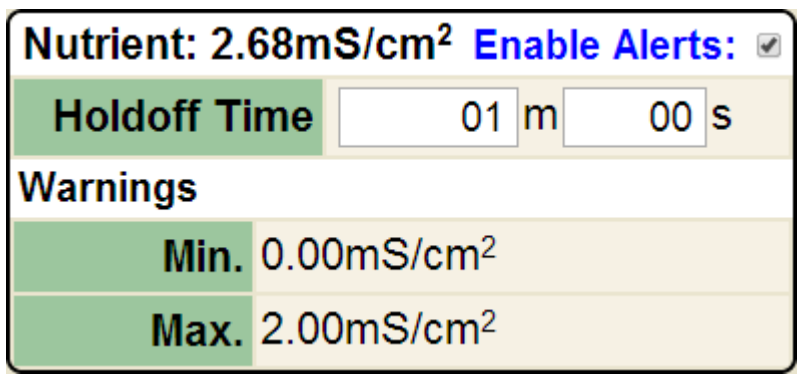


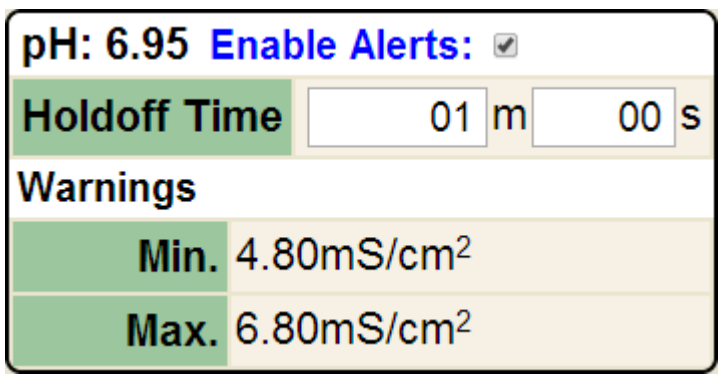
Field	Description
Name	Name given to the solar sensor this will vary depending on the source
Source	Current solar source configured on the system on the Configuration -> Sensors page.
Solar Rad.	Current solar radiation reading being measured from the sensor. If this is XX check the sensor is correctly configured.
Accum. Solar	Accumulated solar for the system based on the configured solar source, this is reset at the systems end of day.

Alarms

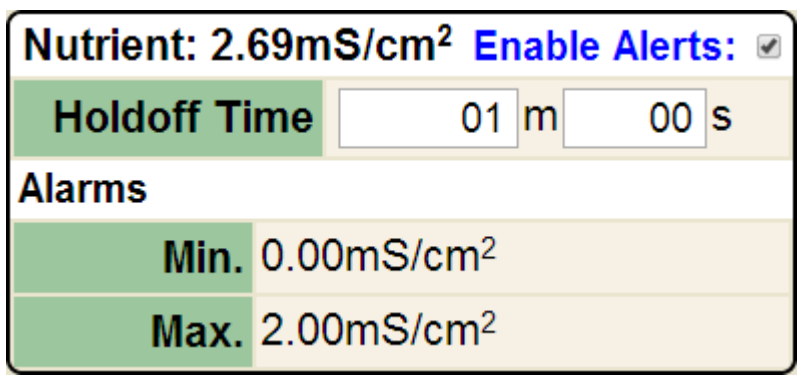
Nutrient / pH Measure

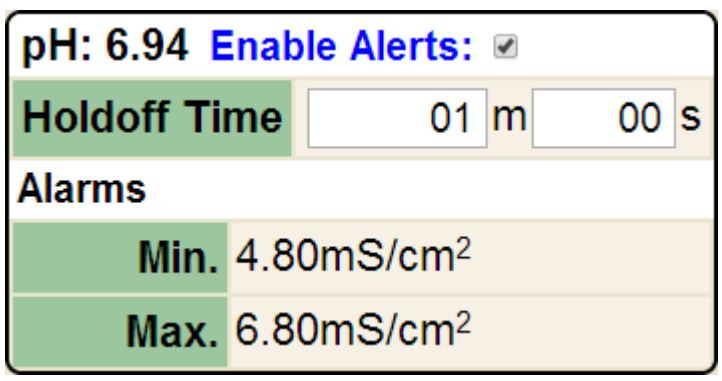
Warnings





Alarms





A group based irrigation system such as inline can have multiple targets form different program throughout the day, because of this the warning and alarm levels for each group can differ and become active when the program dose. Under a group program the ranges must first be enabled in order to modified the warning or alarms levels. There is only one level of modifiers, if range are simply enable these will be applied as warning levels. If the ranges effect the operation of the system, either stop the dosing or the irrigation system, the ranges are applied as alarm levels. When a program becomes active the calculated minimum and maximum will become visible with the nutrient or pH box. The Holdoff time is how long each reading from the Measure sensor group needs to exceed the Min. or Max. level before an alarm is generated.

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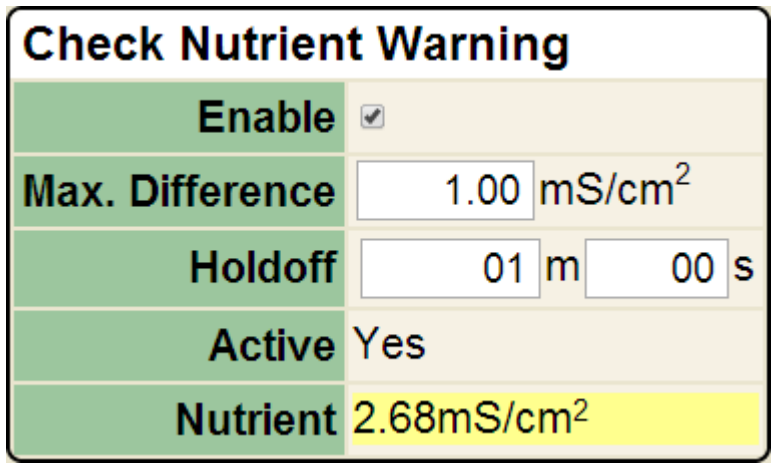
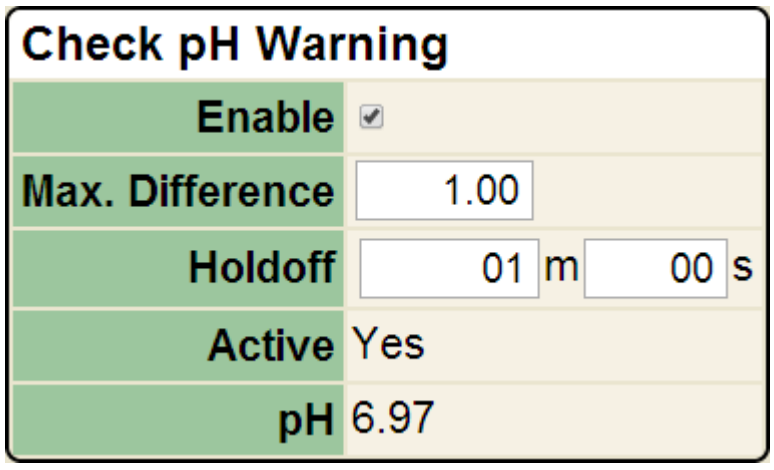
Nutrient / pH Check



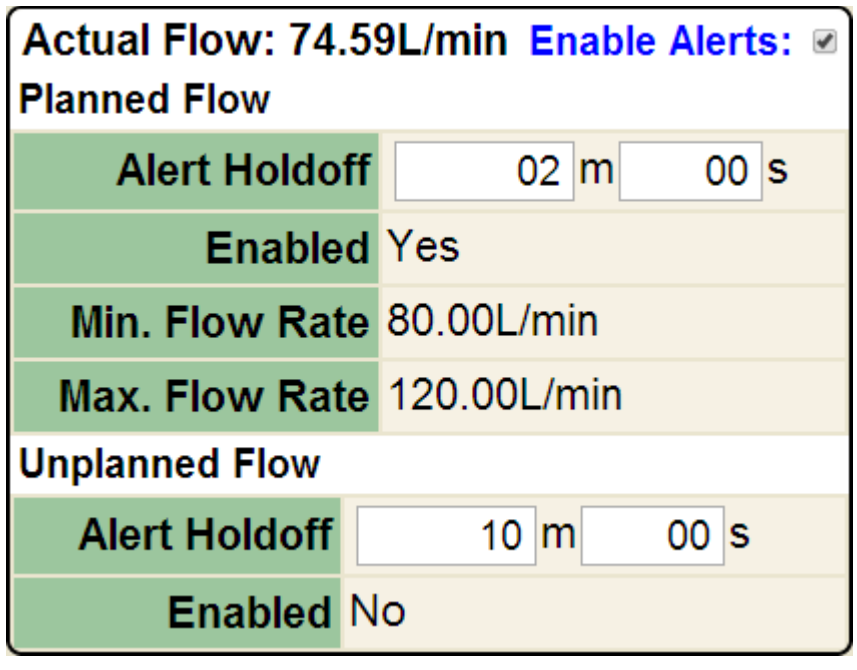


If a check EpM sensor is installed on the system it is possible to configure a warning alarm for the differences between this sensors readings and that of the measure sensor. If the alarm is enabled the reading from the check EpM will be compared to that of the measure EpM is these reading differ by at least Max. Difference for the Holdoff time specified a warning alert will be generated on the system. The current reading from the Check EpM is also displayed at the bottom of the box.

Flow Rate Alarms

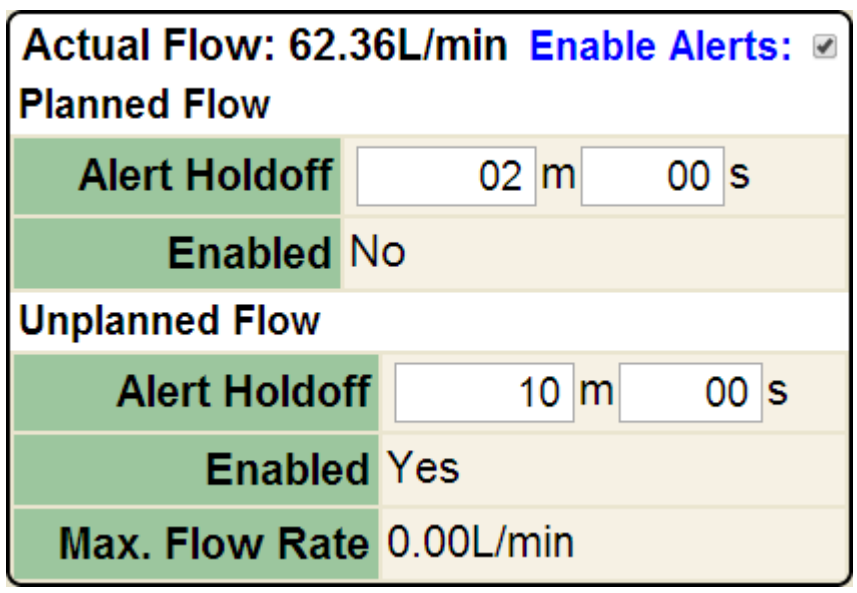
If a flow meter is installed on a system the flow rate alarms can be configured under the water system tab. Here the currently active flow alarms will be displayed. An irrigation system has two flow rate alarms that become active under different conditions (Planned and Unplanned), it is no possible for both of these alarms to be active at the same time.

Planned



If the system has been set up for planned flow alarms these will be displayed here whenever flow is predicted on the system. The minimum and maximum flow calculated for the system are displayed here. If the flow goes outside of these bounds for the holdoff time an alarm will be generated. There are no warning for flow alarms they are always treated as alarm level events, depending on how the flow alarms have been configured it is possible that this alarm will stop the dosing or the whole irrigation system.

Unplanned



If the system has been set up for unplanned flow alarm it will be displayed here whenever no flow is predicted on the system. The maximum flow is a

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set level defined under the water system per time period and if the flow goes above this level for the holdoff time an alarm will be generated. There are no warning for flow alarms they are always treated as alarm level events.

Batch System

The Multigrow batch fertigation has the ability to control up to 300 irrigation stations or zones, which can be split up into 10 trigger groups. Each of the 10 groups can have its own triggers, modifies and irrigation program.

Groups Programmed irrigations can individually select different recipes, nutrient and pH targets during different times of the day. The ability to select recipes is useful to provide special mixes in the evening, perhaps containing extra calcium or other additive or else a different recipe for different stations zones where a different crop may be grown. A single batch system can have up to 10 recipes made of any mix of 10 different parts (A -> J) as well as pH correction in both directions raise or lower.

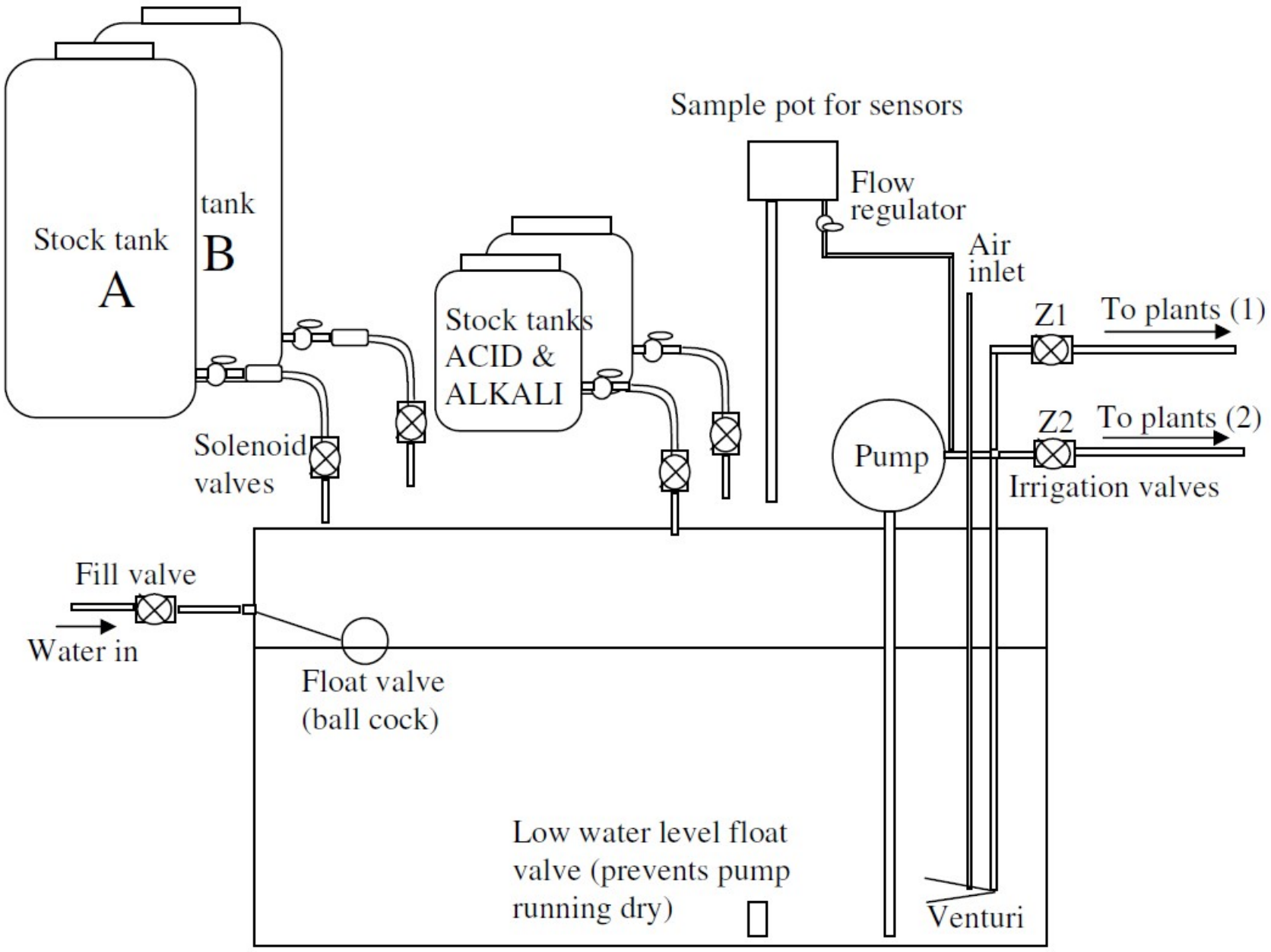
Dosing The batch system has the ability to controller up to 10 different parts as well as both acid and alkali. The controller can be set to use the main pump to stir the tank during dosing.

Filter backwash When set for filter back flushing, the controller will flush the filter within a set window or when a pressure build up is detected. If an irrigation is triggered during a backflush, the flushing will complete and then immediately switch to irrigation.

Filling A tank can be set to fill as soon as an irrigation has been completed or alternatively when an irrigation trigger is received. This is useful when solar heating is used to pre-warm the water just before use.

Suggested Layouts

Simple gravity fed system



Gravity fed systems are most convenient when the batch tank is underground. This allows the stock tanks and the acid/alkali tanks to be located at ground level where it is convenient for replenishing and mixing new stock solutions. Where the batch tank is above ground then there are two possibilities. One is to use dosing pumps such as peristaltic pumps and the other is to use small centrifugal pumps to fill “day tanks” once each morning (from a time switch). These pumps may also be used to help with mixing and the use of day tanks can help minimize risk due to a valve,

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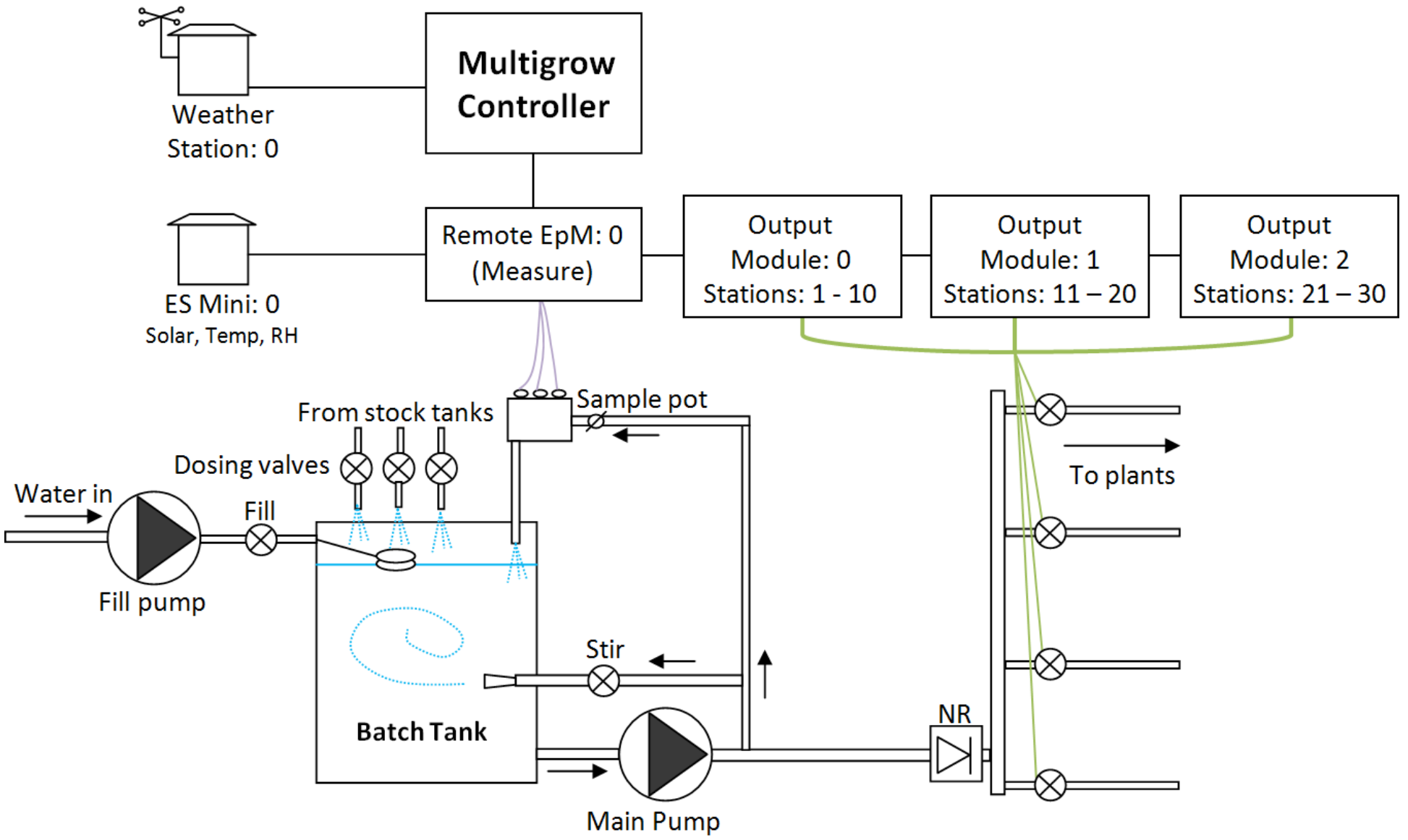
sensor or controller malfunction as these can be sized so that if the total contents was dosed, the plants would survive. If used for mixing the fertilizer, the pumps should be reasonably chemically resistant and capable of handling some solid lumps of fertilizer. Waste water pumps will be often suitable in this application.

Typical system



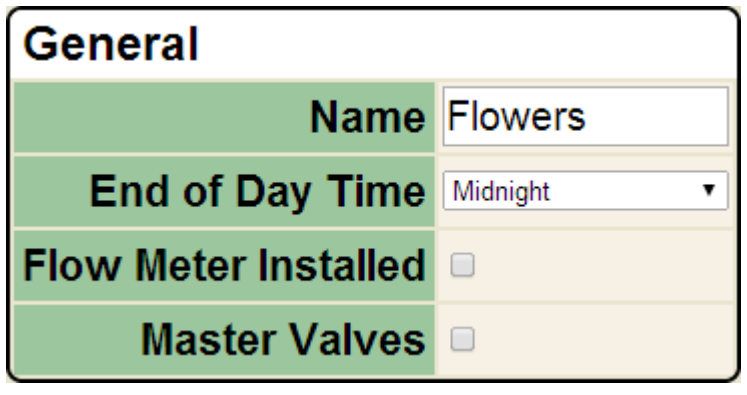
This example system uses a turbulent mixing tank to ensure thorough mixing of the nutrients and pH corrector. The nutrients and pH corrector may be gravity dosed via solenoid valves or else pumps may be used. It is possible to vary this layout to use a single pump for both filling and irrigation by a system of solenoid valves which redirect the water flow. The diagram below shows how this can be achieved.

* The dosing valves or pumps must be large enough to complete a dose in a reasonable amount of time. If you have many irrigation zones then this time becomes more critical. * Two different fertilizer mixes may selected for each zone day and each zone night, solenoid valves select which tank is required (any combination). * The main pump must be able to withstand dilute fertilizer and pH chemicals.

Configuration

General

Each system has a number of generalized settings which can be found on the top tab settings or configuration page labelled as General, and the status tab on the readings page. These areas are used to display the current general information for the system and any generalized setting or configuration options which are not specific to a particular component within the system.



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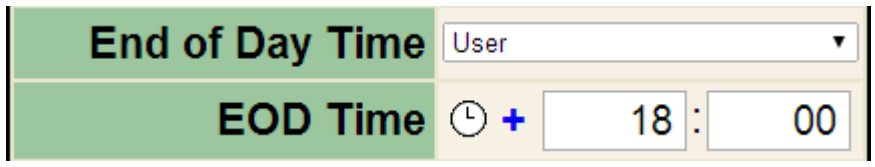
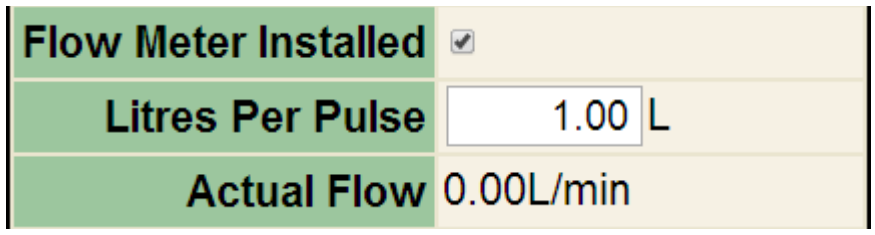
Name: Name for the current system, this is the same setting as found on the summary page.

End of Day Time: An Irrigation system has a few different readings which need to reset daily, this option allows you to select whether these variables are reset at Midnight local time or at a specific time of the day.



EOD Time: If the End of Day Time has been set to User this option will become available. Here a specific time of day can be used to reset specific readings.

Flow meter Installed: If the system has a flow meter installed that is used to measure the irrigation flow this box needs to be ticked.



Litres Per Pulse: This setting box is only displayed once the Flow meter Installed box has been ticked. Here the flow rate of the installed meter must be specified, this value should be specified by the manufacturer of the flow meter.

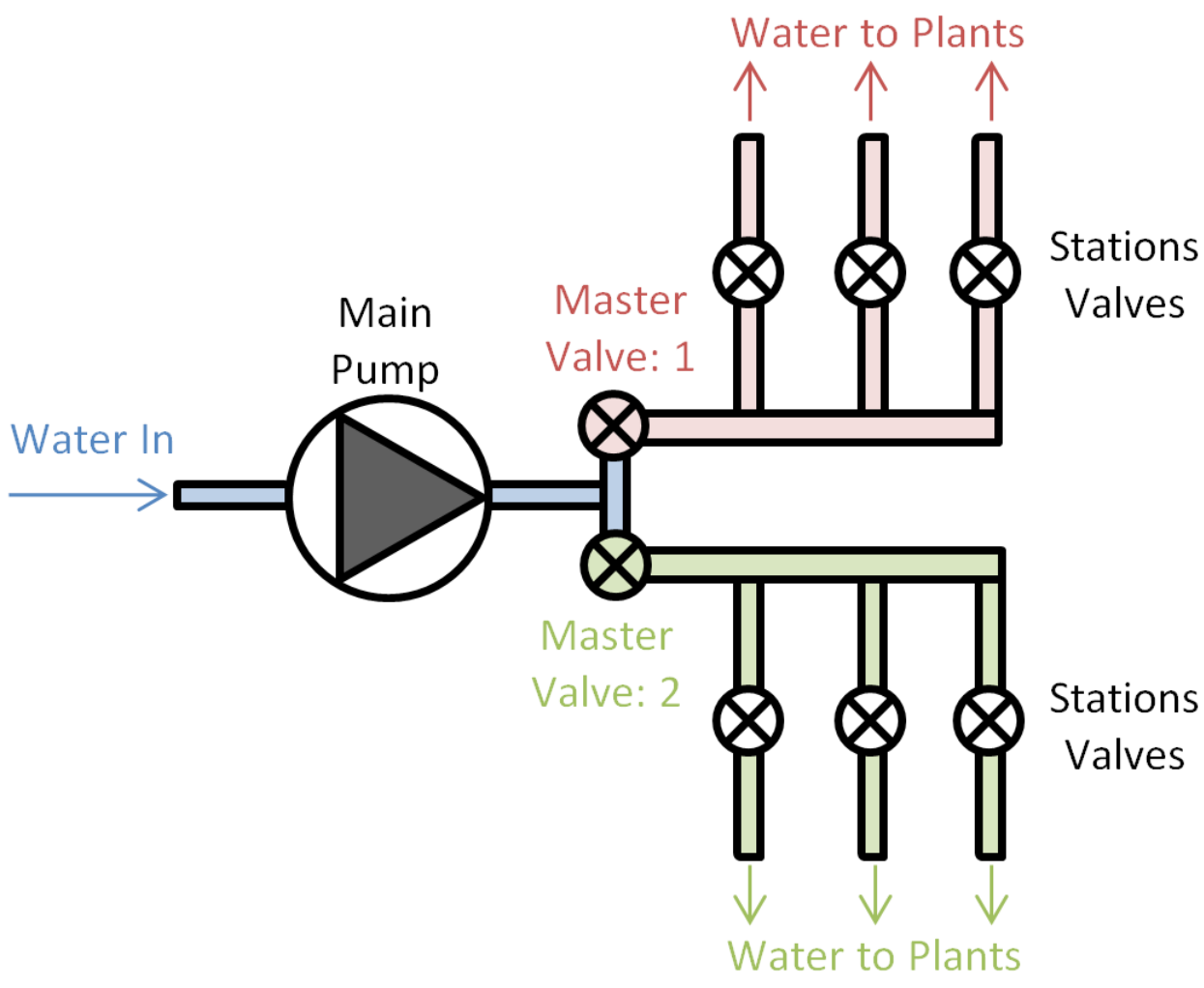
Actual Flow: This is the current flow rate being measured by the system.

> A Remote EpM sensor must be configured in the system before this reading will display correctly

Master Valves: If the system has master valves this box needs to be ticked in order to configure them. This option is not available on a continuous type system, master valves can only be installed on systems that control the watering side of the irrigation.

Master Valves

A master valve is used if the system has multiple pipes going for a single irrigation source to different crops. They physically separate the pipe lines for different stations (zones).



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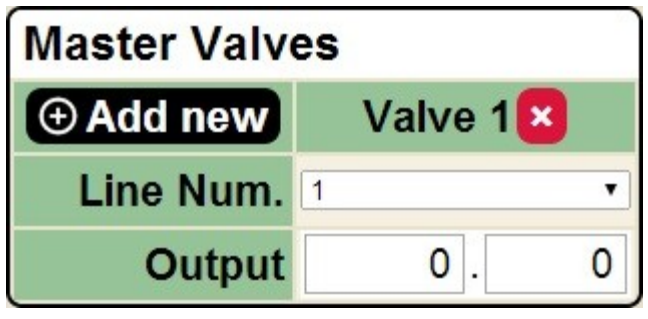
Adding a Master Valve

Pressing the add new button will add a new master valve into the irrigation system, once a new valve is installed it can be configured.



Line Num.: This is a logical line number associated with a certain master valve, this number is used when assigning Stations (zones) to a line.

Output: Address of the output expander this master valve is wired to, see section blah configuring a single output for more information.

Time Periods

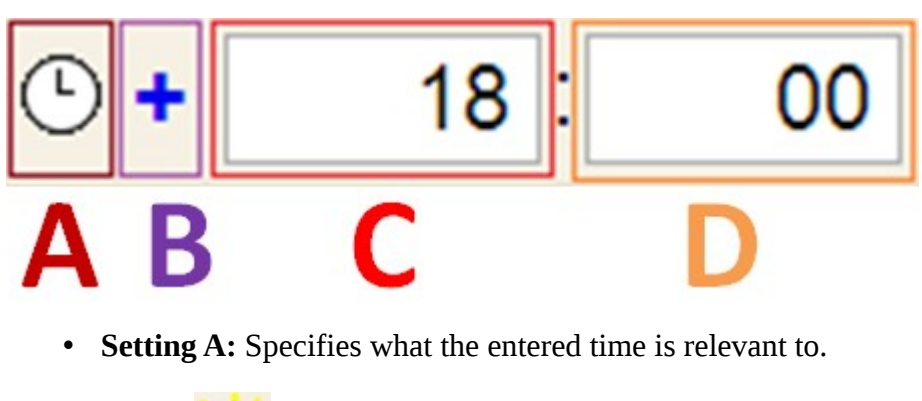
Time periods for the system can be defined here, up to 5 time periods can be supported by each component within a manager. can be defined as a time of day, offset from sunrise or offset from sunset. The name of the time period is not important for control but very useful when configuring time period dependent variables. Whenever one of these variables is displayed in the system it will appear within a list of all configured time periods so is very important to make the names of each time period something to help identify. Useful names could be the times of day (7am-10am), solar events (Sunrise, Noon), specific time period purposes (Heat trap, RH purge), Times of the day name (Dawn, Morning) or any other useful identifier.

Name: Specify unique name for this time period.

Start Time: Specify the start time for this time period.

Configuring a Time of Day variable

A time of day variable are used through out the Multigrow system they are variables that will cause a specific event to happen at a specified time.



- **Setting A:** Specifies what the entered time is relevant to.
  - Selecting this icon means that the specified time is an offset from sun rise.
  - Selecting this icon means that the specified time is an offset from sun set.
  - Selecting this icon means that the specified time is a positvie offset from midnight, this is the same format as standard 24 hour time, 07 00 = 7 hour offset from midnight (7am), 19 00 = 19 hour offset from midnight (7pm).
- **Setting B:** States whether the offset being applied is positive or negative to the time specified. Note, when using a normal time this will be positively applied regardless of the setting.
  - The time specified is a positive offset from the first setting.
  - The time specified is a negative offset from the first setting.
- **Setting C:** The offset time hours are specified here.
- **Setting D:** The offset time minutes are specified here.

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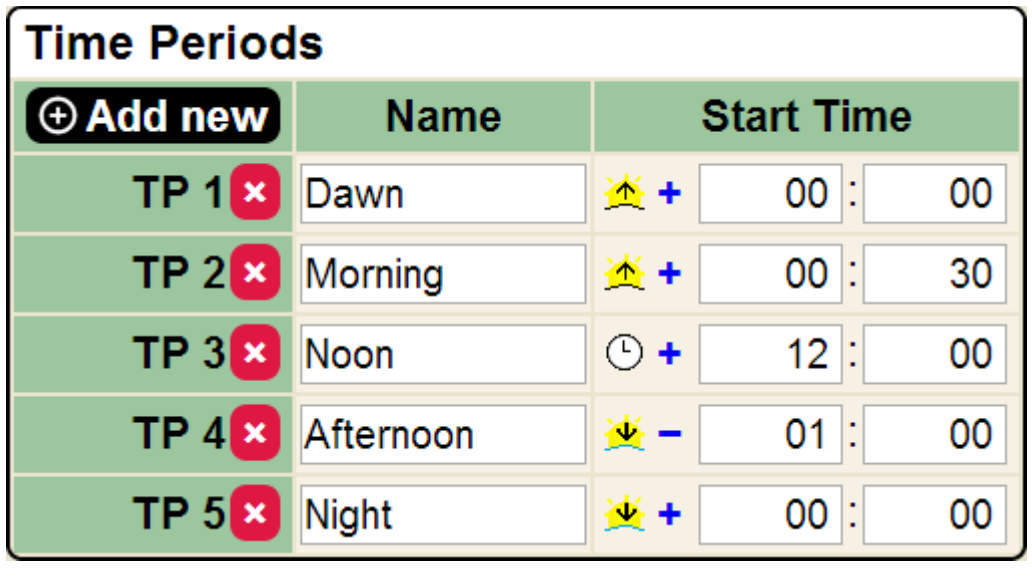
Using time periods



Each time period is active from the time specified within the box until the time of the next period. In the above configuration you can see a combination of various types of time periods.

If we take Sunrise to be 7:00am and Sunset to be 5:30pm, the time periods for the day work out to be;

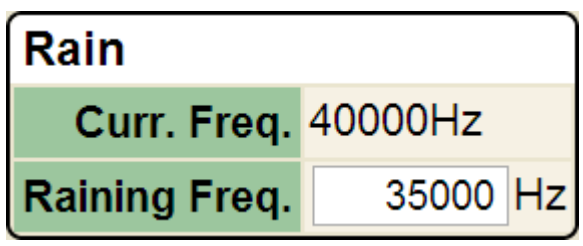
Time Period	Name	Start	Stop
1	Dawn	7:00am	7:30am
2	Morning	7:30am	12:00pm
3	Noon	12:00pm	4:30pm
4	Afernoon	4:30pm	5:30pm
5	Night	5:30pm	7:00am

Settings

Time Periods

The first box visible on this page is used to configure the time periods of the system. These settings are identical to the one found on the configuration page, please refer the configuration section above for more information on this settings box.

Rain

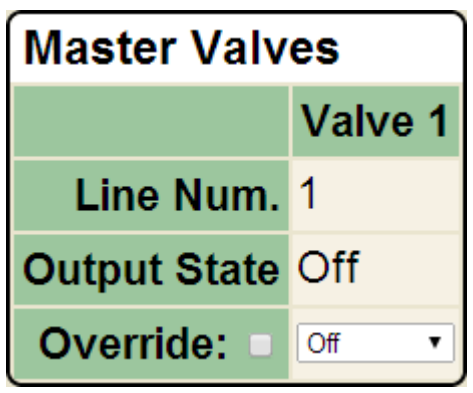


An irrigation system can use rain to reset certain triggers within a system, here the setting for this can be modified. Note a weather station is used to supply the status of the rain to the system and must be properly configured for this functionality to work correctly.

Curr. Freq.: Current frequency being measured by the weather station.

Raining Freq.: Frequency in which this particular irrigation system deems it to be raining.

Master Valves



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Master valves have only one setting which can be found within this box they can only be overriden to a set level.

Line Num.: The line number assigned to the master valve.

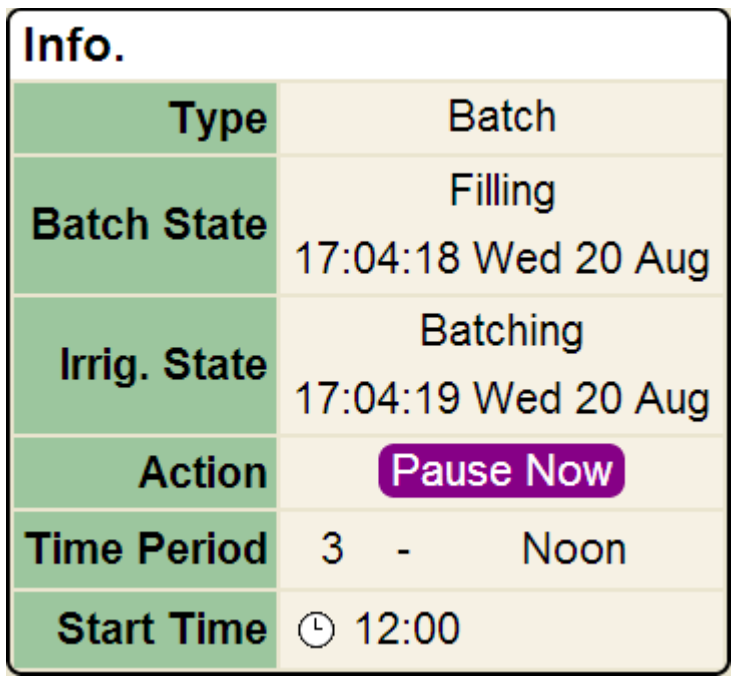
Output State: Current state of the master valve output.

Override: Ticking this box will software override the output to the state specified in the drop down box.

Readings

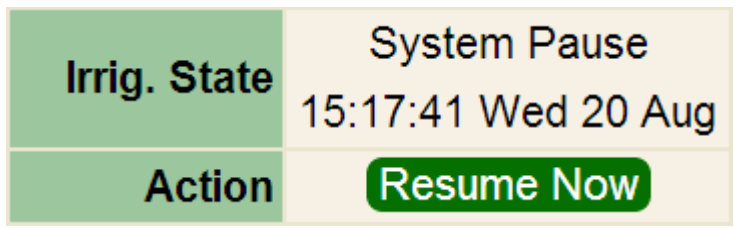
The Readings -> Status page for any irrigation system contains a quick snap shot of the systems current state. A small selection of important readings for each installed module will be displayed here.

Info.



Field	Description
Type	Configured type of irrigation system.
Batch State	Current state of the batching part of the system and when it changed to it.
Irrig. State	Current state of the irrigation part of the system and what time it changed to it. Note that when the batching module is not waiting this state will be reported as batching to indicated the irrigation system is waiting on the batch tank. If the batch tank is inactive this will be reported as waiting. If the batch tank is watering the irrigation state of the system is irrigating.
Action	User action buttons are displayed here, different buttons will be displayed depending on the state of the system.
Time Period	The current active time period on the system, included the number of period and the name given to it.
Start Time	Start time of the current time period.

Action - Pause Now



If the pause now is pressed while an Irrigating is active the whole system will be paused, when this happens the Action button will be changed to a Resume Now button and the Irrig. State will change to System Pause. When resumed the system will start up from where it was last in the irrigation cycle.

Action - Retry Now

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Irrig. State	Pump Error 15:24:35 Wed 20 Aug
Action	Retry Now for 10s

If an error occurs on the system that means it should stop running the current irrigation will be paused. However some error such as flow or pump need the system to actually try and run in order to check that the error has been resolved. When an error occurs a Retry Now button will appear along with a time to retry for. Pressing this button will resume the system momentarily but if the error is still present after the time specified the system will stop running again. The time the system will retry for is found on the Settings -> Water System page. When the retry now button is pressed the Action field will be updated to reflected this.

Irrig. State	Pump Error 15:24:35 Wed 20 Aug
Action	*Retrying System*

Group Info.

Group Info.	
Act. Groups	All Beds
Act. Stations	Bed 1
Act. Lines	1

When a group becomes active the name giving to the group will appear in this box to indicate that it is running, if the group is unnamed the number of the group will appear. The stations that are active are also displayed in this box as well as the current main lines if installed.

Act. Groups	All Beds, 2
Act. Stations	Bed 1, Bed 3/4
Act. Lines	2, 1

If the system is configured to run multiple groups or stations these will be displayed here separated by a common.

Act. Groups	All Beds
Act. Stations	Bed 1 (Paused)
Act. Lines	

If a system becomes paused the current active stations will be paused the groups are still deemed as active so they can be viewed here even though they are technically not active at present. Any active stations are append with the (Paused) label to indicated that are not running. Since no stations are active the active main lines will be turned of and disappear from the list.

Active Program

Active Program	
Name	Main Prog
Recipe	Day Mix

On an inline system the desired nutrient and pH levels of the day are always trying to be maintain, this means there is always an active program and recipe.

Field	Description
Name	The name of the currently active program, this is note that on a continuous system there is only one program so this will always be the same.
Recipe	The name of the current active recipe for this time period.

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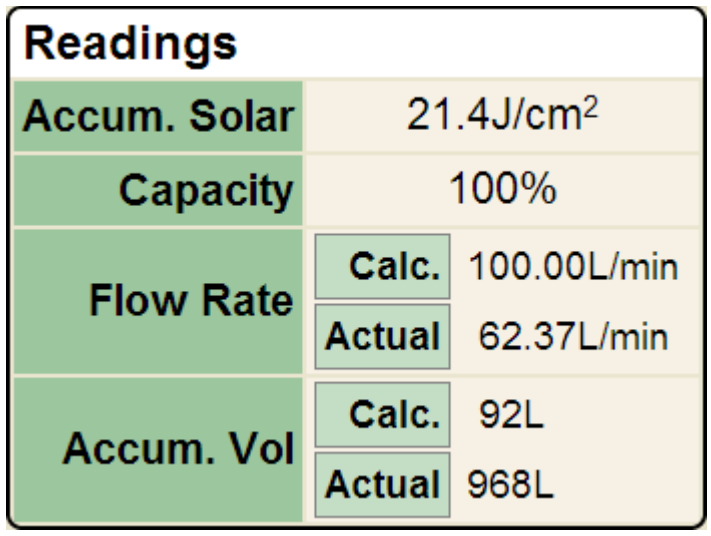
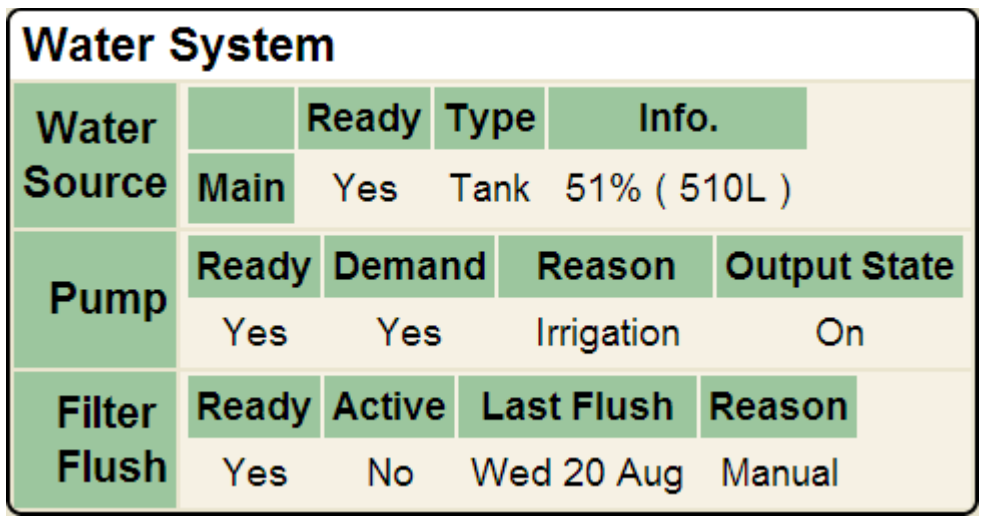
Readings



Field	Description
Accum. Solar	Accumulated solar from the systems solar sensor, this is reset at the end of day for the system.
Capacity	Current capacity the system is running out this is derived using the current calculated flow rate of the system and its maximum capacity.
Flow Rate	The current flow rate of the system if a flow meter is installed on the system both the calculated and actual flow rate will be displayed here. If the system does not have a flow meter the reading here will be the calculated flow only.
Accum. Vol	The current accumulated volume of the system if a flow meter is installed on the system both the calculated and actual volume will be displayed here. If the system does not have a flow meter the reading here will be the calculated accumulated volume. Both these reading will be reset at the systems end of day.

Water System



Depending on what modules have been installed on the system the information in this box will vary.

Water Source

The "Main" label that is shown in the above screen capture is actually the name given to this water source, this will vary depending on what the name of the source is set to. If no name is given this will appear as simple "Source".

Field	Description
Ready	Is the current configured water source ready. Note a town water supply is always ready.
Type	Type of water source configured.
Info.	If a water source has been configured as a Tank or Batch tank system the current fill level will be displayed here in both percentage and litres. Town water source does not have any relative information so is left blank.

Pump

If a pump has been installed on the system relevant information will be displayed here.

Field	Description
Ready	Is the pump ready to run.
Demand	Is their a demand for the pump to be on, if so the output should be on.

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Field	Description
Reason	The reason why the pump is on. If the pump switch is in manual or the system cannot communicate to the pumps output module this will cause an Output Error on the system.
Output State	Current actually state of the output the pump is physically wired into.

Filter Flush

If a filter flush module has been installed on the system the relevant information will be displayed here.

Field	Description
Ready	Is the filter flush ready, this means a flush is not currently active on the system.
Active	Is the system actively flushing the filter currently.
Last Flush	The date of the last completed flush.
Reason	The reason for the latest filter flush.

If a filter flush is currently active an additional field will appear with the time left until it is completed.

Time Left
1m 50s

Also if a filter flush is installed and becomes active the main pump for the system will be shut off unless the run pump setting for the flush has been configured.

Nutrient

Nutrient	
Reading	0.84mS/cm^2
Temp.	26.7°C
Target	1.00mS/cm^2
Dose Status	Dosing

If the system has been configured to use nutrient dosing the current state of this module will be displayed here.

Field	Description
Reading	Current reading the system is using for dosing control, this is provided by the Measure EpM sensor group.
Temp.	Current tempeture of the water the probe is in, this is also provided by the Measure EpM sensor group.
Target	Current target the system is trying to achieve, this is set on the Settings -> Program page.
Dose Status	Current state of the nutrient dosing module.

pH

pH	
Reading	6.87
Target	5.80
Dose Status	Interval

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If the system has been configured to use pH dosing the current state of this module will be displayed here.

Field	Description
Reading	Current reading the system is using for dosing control, this is provided by the Measure EpM sensor group.
Target	Current target the system is trying to achieve, this is set on the Settings -> Program page.
Dose Status	Current state of the pH dosing module.

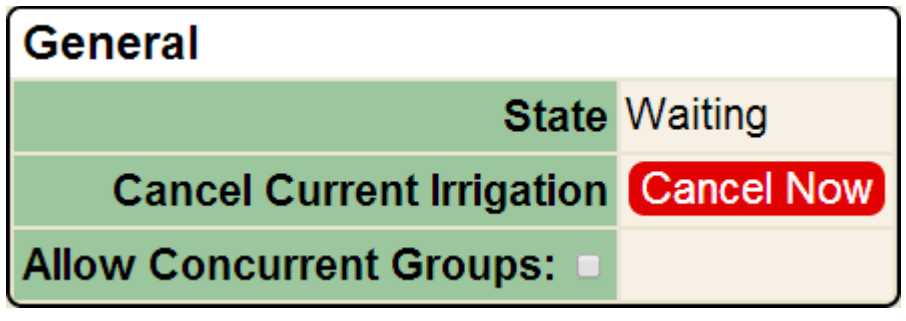
Groups

A group is a logical collect of stations (Zones) within an irrigation system. These maybe similar plants (Tomatoes, Flowers) Perhaps a where things are physically located (Compartment 1, Outside Crop) or collection of drippers (Bed 1, Bed 2). Each group can have various triggers source such as solar, time of day,. A group can also be manual triggered. In system such as Inline and Batch a Program and Recipe can be assigned to each groups so watering of different groups can have varying Nutrient and pH targets as well as differing recipe mixes.

Example here:

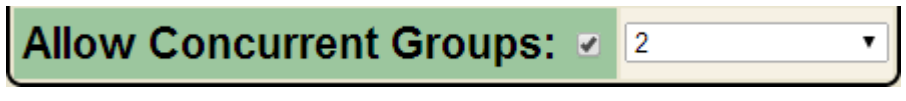
Settings

General



State: Current state of the irrigation system

Cancel Current Irrigation: Pressing the cancel now button will immediately cacncel all current active irrigation's. Note that pending irrigation's may start after this.

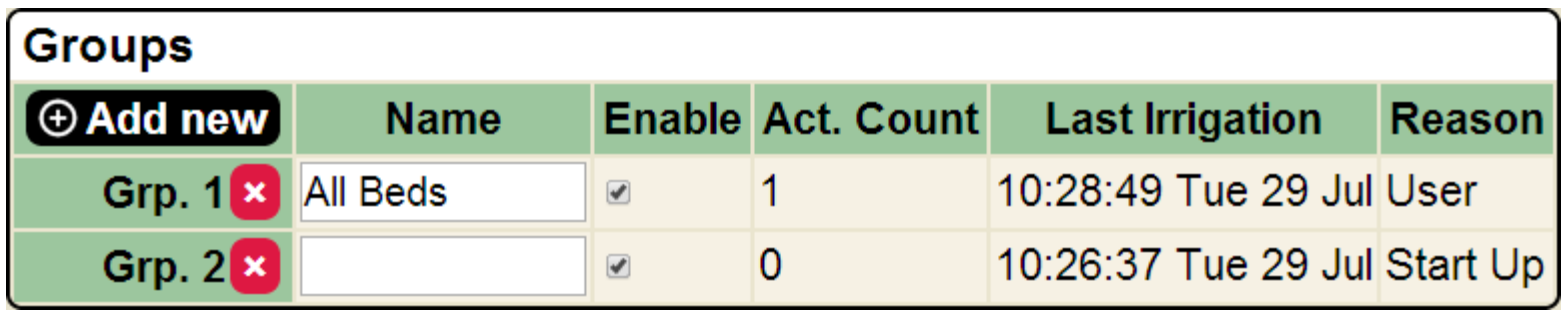


Allow Concurrent Groups: This setting allows more than one group to operate simultaneously on the system. This should only be used if an adequately sized pump has been installed. In the case of inline injection or batch dosing using this setting will mean all groups must run using the same program and recipe as all water is passed through the same dosing system. Ticking the box will reveal a drop down box where the number of groups can be specified. This number is a maximum number of groups that can be on at the same time.

Enable Post Fill Dosing: This option is only available on a batch system, this will enable the batch tank to dose while doing a post fill. This will however restrict the system to a single program and recipe, which will be used for post fill dosing as well as normal dosing when a group is triggered.

Groups

Groups can be added to the system by the use of the add new button in the groups box on the group tab.



Name: A unique name should be given to each group in order to better identify it within the system this name has no effect on the control. Once a

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group is added and name it will appear along the tab menu for groups under the name given. Note if the name field is left empty it will be identified using the number of the group.

Enable: This box must be ticked if this group is going to be active. A group might have various triggers configured and needs to be disabled unticking this box will stop the group from running without having to disable the trigger set up on the group.

Act. Count: How many times the group has been active today, this variable is reset at the end of day time.

Last Irrigation: The last time the group was irrigated. Note if the controller is reset all groups will have the same time until triggered. Also if a new group is added the time will be set to the time it was activated.

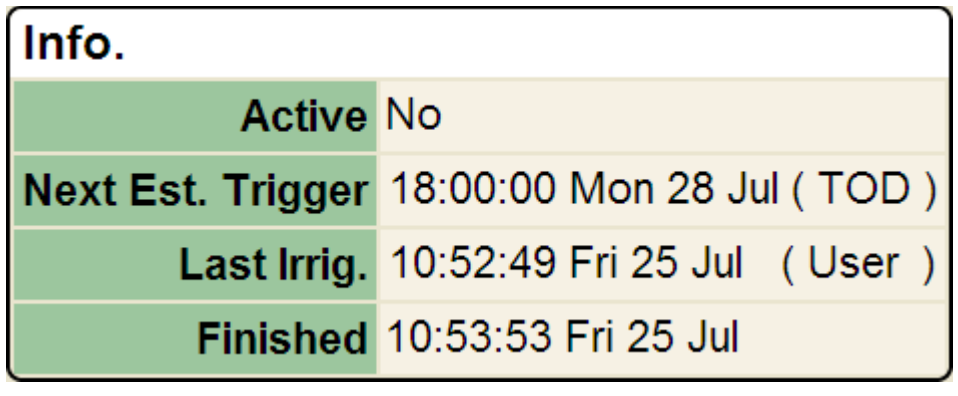
Reason: The reason why the last irrigation happened, this is the trigger cause of the group. Even if the group is cancelled right away this will still be updated. Note that if the system is reset all groups will have start up as the reason. If a group has start up as the reason it has not run since the last time the controller was power cycled. This is also the default reason used when a group is created.

Group

By navigating to the name of the group on the groups tab menu each groups individual settings can be accessed.

Stations

The stations tab is where individual stations can be added to the group a manual action button are also located here as well as general information about the group.



The Info. box contains all relevant information about the group and it's last irrigation.

Active: This variable is used to indicate if this group is currently being water by the system.

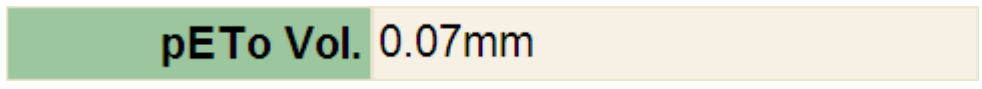
Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

Last Irrig.: The time of the last irrigation trigger for the group and the reason it happened.

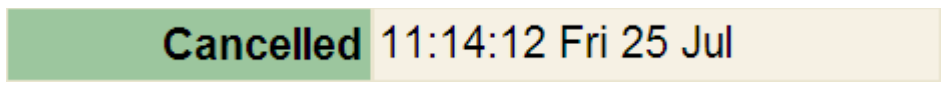
Finished: The time the group finished it last watering.

Additional Information

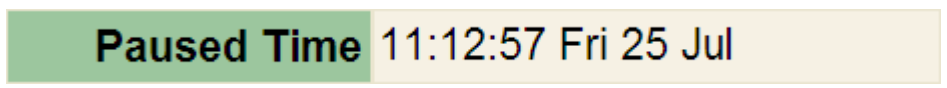
Depending on how the irrigation went or configured triggers the information box can contain additional fields.



If the group has been configured to use pETo triggers the current volume of this will be displayed in the Info. box. Note that pETo triggers are complicated and should not be used without a full understanding of the Evapotranspration model.



If the group was cancelled this reading will be displayed with the time this occurred, since a cancel is a user only event no reason will be given for this.



If a group was paused while it was watering the time at which this happened will be displayed in the Info. box.

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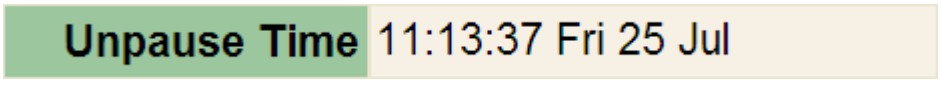
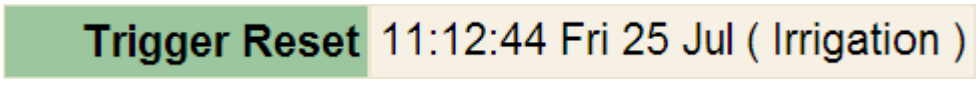


When the group was unpaused the time at which this happened will be displayed in the Info. box.

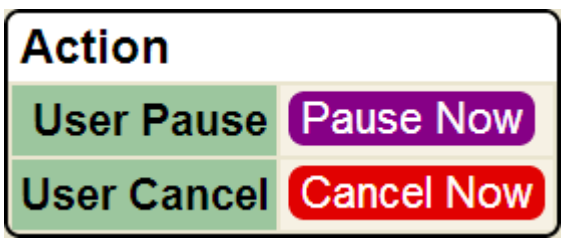


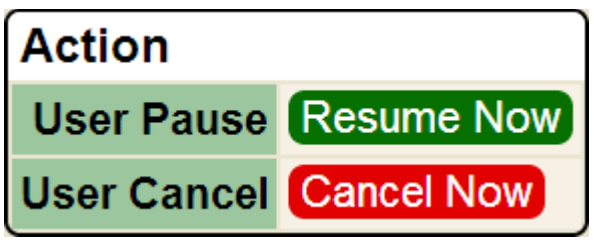
If the group is configured to have periodic triggers the reading which drive these are reset whenever a group is triggered. The reset source can be because the group was irrigated or manual reset. The time at which this happened will be displayed as well as the reason.

Action

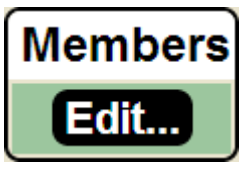
The action box is a quick way to trigger an irrigation on a group from the stations page. Pressing the Irrigate now button will cause an immediate trigger. Note depending on how the system is configured and what may already be running the group may not actually start irrigating straight away, a trigger will however be queued for this group.

Once triggered the action box will change to enable you to either pause/resume a group or cancel this group.

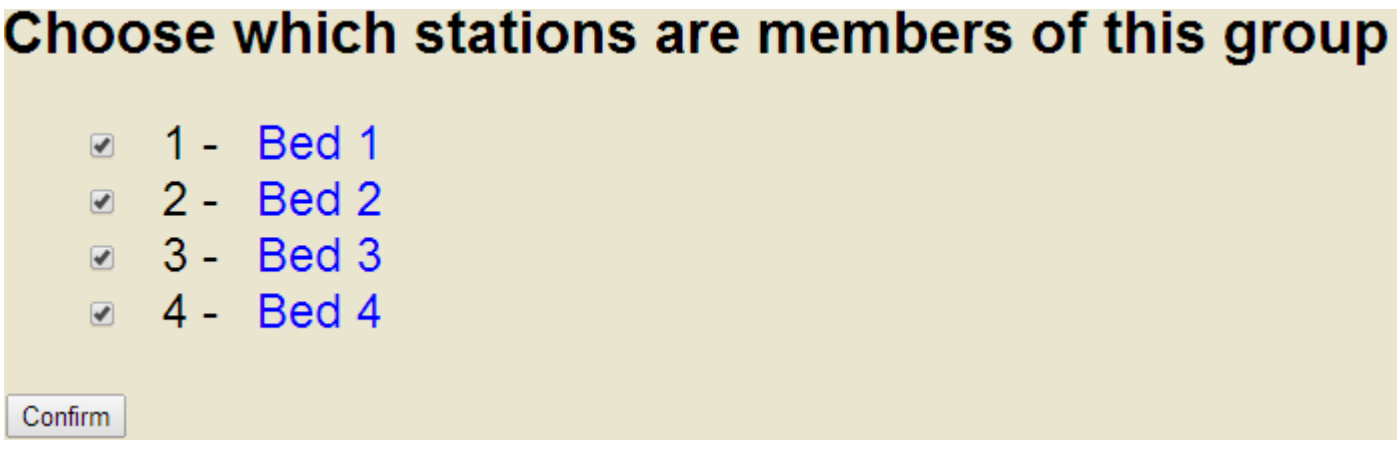




Members

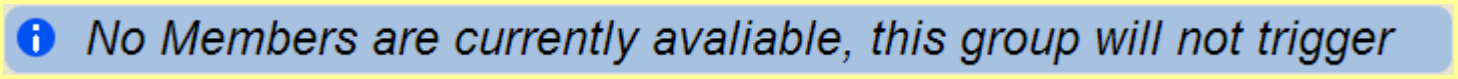


Each group can have up to X amount of members configured. A member is a station (zone) assigned to a group. Pressing the Edit.. button will bring up the members selection page.



Here placing a tick box beside the desired station will add it to this group. The blue field is the name that has been given to the station underneath the configuration page if this is blank the number represents the number of the station. Once all members have been selected press the confirm button to return to the previous page.

If there are no members configured on a group it will not trigger, the follow message will be displayed if this is the case.



Once members have been added to the group and activative this error message will disappear.

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Members

Edit...	Enable	Run Time
Bed 1	☑	01 m 00 s
Bed 2	☑	01 m 00 s
Bed 3	☑	01 m 00 s
Bed 4	☑	01 m 00 s

Enable: Though a stations is added to a group it may need to be disabled for a period of time. Unticking the enable box will stop this group being watered when this group is triggered.

Run Time: The time the stations will be watered for this is set per member per group so each stations run time can be varied simply by the run time specified in the member.

If a station is not enabled under the station configuration page, it cannot be run under any group. It can still be selected as a member but the following box will be displayed.

Bed 4		Disabled in Configuration

The stations must be enabled in order to water this station.

Start Delayed Groups

Members

Edit...	Enable	Start Delay	Run Time
Bed 1	☑	00 m 00 s	01 m 00 s
Bed 2	☑	00 m 00 s	01 m 00 s
Bed 3	☑	00 m 00 s	01 m 00 s
Bed 4	☑	00 m 00 s	01 m 00 s

If group has been setup to ignore the capacity check under the Group->Settings tab then each station will run regardless of if the system capacity is exceeded. This can cause problems if the pump isn't big enough to handle this so a start delay can be used to offset stations to ensure that stations that will run together that will exceed capacity. Note start delays only make sense if multiple stations are being run at once or concurrent groups are running simultaneously.

pETo Run Times

Members

Edit...	Enable	Type	Run Time	Active
Bed 1	☑	Time	01 m 00 s	1m 0s
Bed 2	☑	Volume	01 m 00 s / 1.0mm	0m 7s
Bed 3	☑	Crop Coeff	0.50	0m 3s
Bed 4		Disabled in Configuration		

If a group is set up as a pETo group the run time for each station can be varied based on how much volume of ETo the group has measured.

Enable: The enable setting remains that same as a normal.

Type: Here the type of run time can be specified for each member of the group.

- **Time:** This is a straight forward time and will always run at the station for this length.

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- **Volume:** This will modify the stations run time based of the current pETo volume.
- **Crop Coeff:** The run time will be modified based on the pETo run time specified for the station under the configuration.

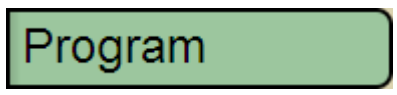
Run Time:

- *Time:* If the Type is configured as a time the run time setting is a simple time.
- *Volume:* The Run Time will be modified based of the current pETo volume being measured. In the example the current run time will be 1 Minute for every 1.0mm volume measured.
- *Crop Coeff:* The crop Coefficient type means that as the crop changes the run time needs to be modified. The pETo run time is consistent so is configured as a stations based setting on the configuration page and the members modify the effect of this. If the stations pETo run time is configured as 1 Minute per 1.0mm and the Crop Coefficient as 0.50 then at actual effective pETo effect is 1 Minute per 2.0mm

If a Coefficeint type run time is going to be used the pETo Stations enable setting on the configuration page must be enabled if this is not the station will be given a run time of 0m00s and this error message will be displayed.

Active: Current run time the station will be assigned if triggered.

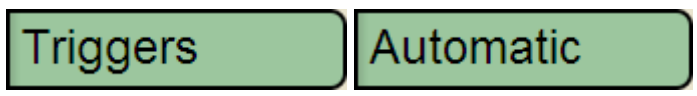
Program



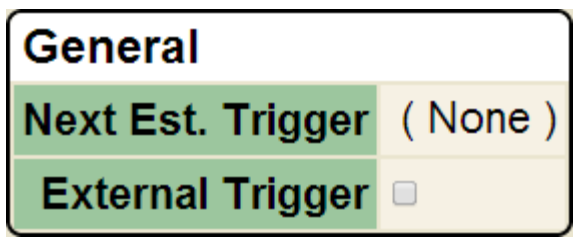
Programs can be individually assigned to each group within an Inline or Batching system, depending on how a system is configured. If the system is an inline system and is set up for concurrent groups a single program is given for the system rather than per group as this doesn't make sense if multiple groups can run simultaneously. This is similar to the post fill dosing option for a batch system where the tank will already be pre-batched with a certain program and recipe so all groups must use the same one. For information about how to configure a program please see the section on Programs later on in the manual.

Triggers / Automatic

The trigger tab will appear as Automatic if the group is configured as manual. Here is where all none periodic triggers are configured.



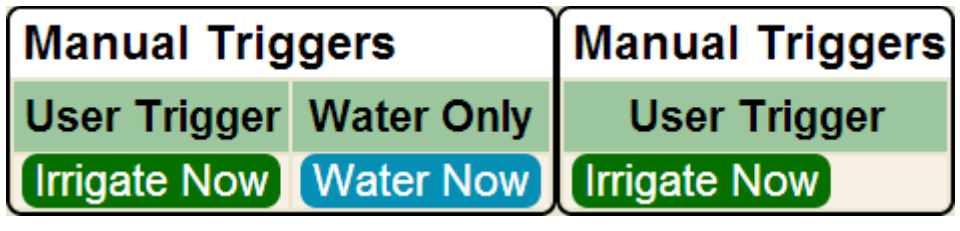
General



Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

External Trigger: An external trigger is a contact closure input wired into an Remote EpM module under the CC input pin or the Moist input on connector B. When this input is pulled the appropriate level by the use of a contact an irrigation is triggered. This can be used with the wall mounted button for example.

Manual Triggers



The action box is a quick way to trigger an irrigation for a group. Pressing the Irrigate now button will cause an immediate trigger. Note depending on how the system is configured and what may already be running the group may not actually start irrigating straight away, a trigger will however be queued for this group. A inline or batching system also has the ability for a water only trigger, pressing the Water Now button has the same effect as a

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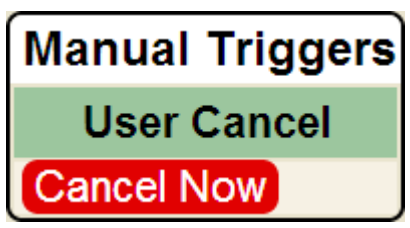
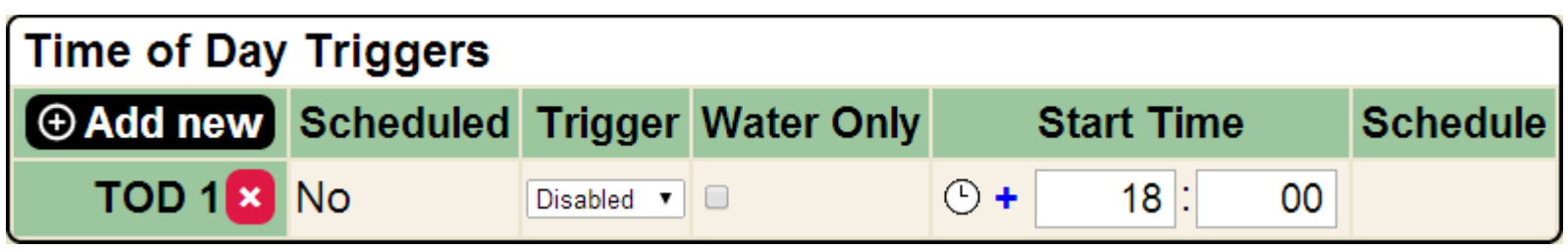
the Irrigate Now except the dosing will be disabled for this group. If the system is a watering system the Irrigate Now button and the Water Now button will result in the same effect so only the Irrigate Now button is viable on this type of system.



Once triggered the action box will change to enable you to either pause/resume a group or cancel this group.

Time of Day Triggers (TOD's)



A Time of day trigger sometimes referred to as TOD is an automatic triggers that will happen at the same time everyday. This will depending on other settings such as days of the week enables and if the trigger is scheduled. Each group can have up to 8 Time of Day triggers.

Scheduled: Is this Time of Day currently scheduled. Note Automatic triggers are always scheduled unless the day of the week is disabled under settings.

Trigger: What kind of trigger this time of day uses.

- ***Disabled:*** Time of day trigger is currently disabled.
- ***Auto:*** Time of day trigger will happen everyday that is allowed to trigger on.
- ***Manual:*** The time of day trigger will only be trigger once then will need to be re-scheduled in order to trigger again.

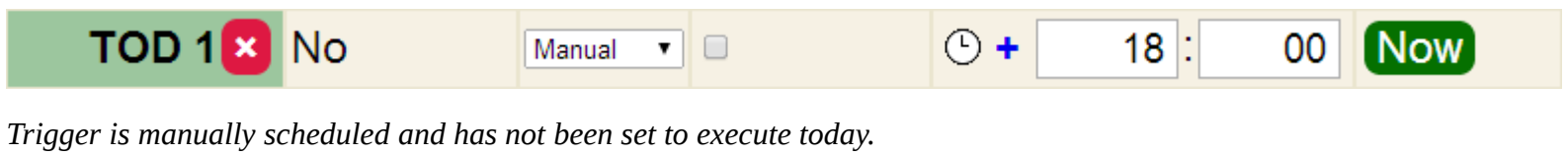
Water Only: The Time of Day trigger will trigger a water only irrigation for the group.

Start Time: The time at which this particular trigger will start at.

Schedule: If a manual Time of day trigger is being used a Now button or Cancel button will appear in this box.

Trigger is automatically scheduled and will be executed as 6pm today.

Trigger is automatically scheduled but will not run today at 6pm because the group is not allowed to trigger today this is shown by the (DOW) next to the No.



Trigger is manually scheduled and has not been set to execute today.

Trigger is manually scheduled and has been set to execute today at 6pm.

The current group does not have any members assigned to it, this means it is unable to trigger and will not execute this trigger.

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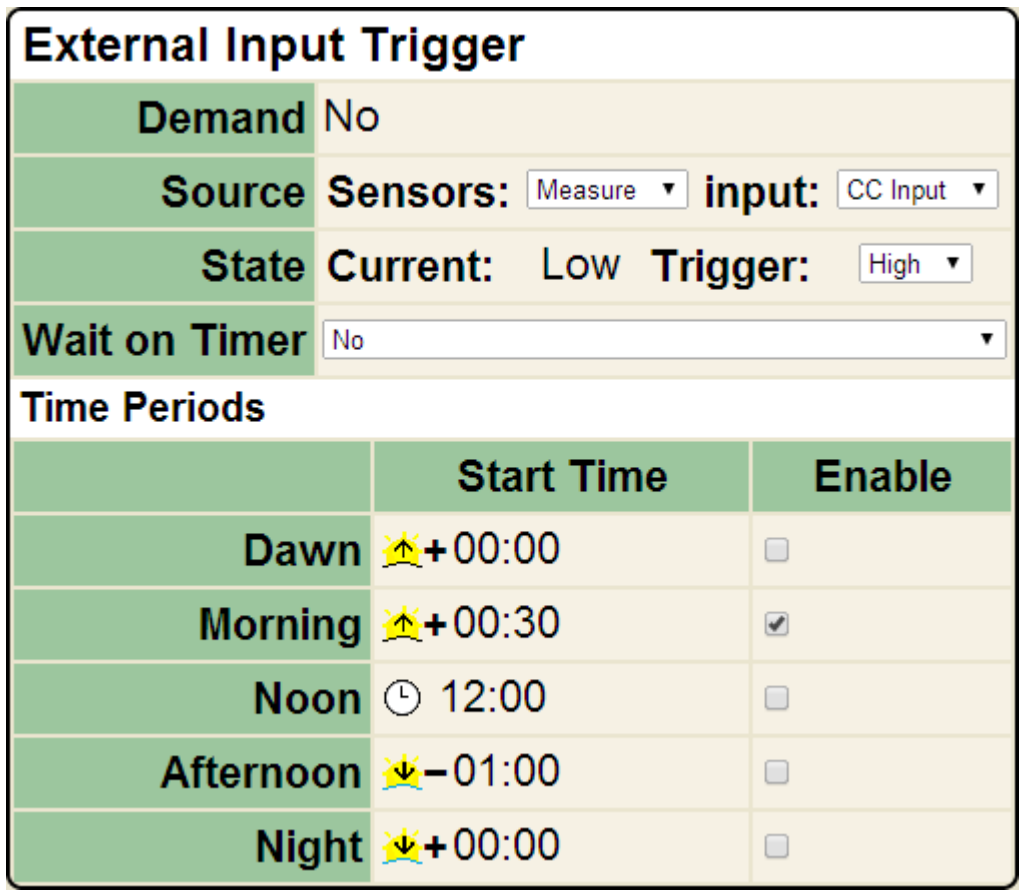
External Input Trigger



Demand: Is an external input trigger demand, once this trigger has been processed this demand will be cleared however the group may not of started irrigating yet. If the trigger is not enabled during this time period the system will

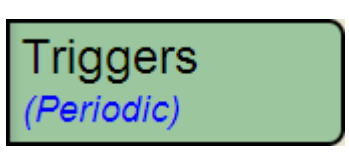
Source: Defines exactly where the input is coming from, this trigger can be activated from any of the three local system sensors. And can be from either the CC input pun or Analog input pin of the device. Note that the appropriate Use Me var must be configured under the sensor setting for the group to ensure that the system

State: List the current state of output as well as the level needed to on the input to action this trigger.

Wait on Timer: If a periodic minimum time out is being used under the group periodic triggers the external input trigger can be configured to obey this. Setting this field to yes means and external trigger cannot be processed until the minimum time out has been reached.

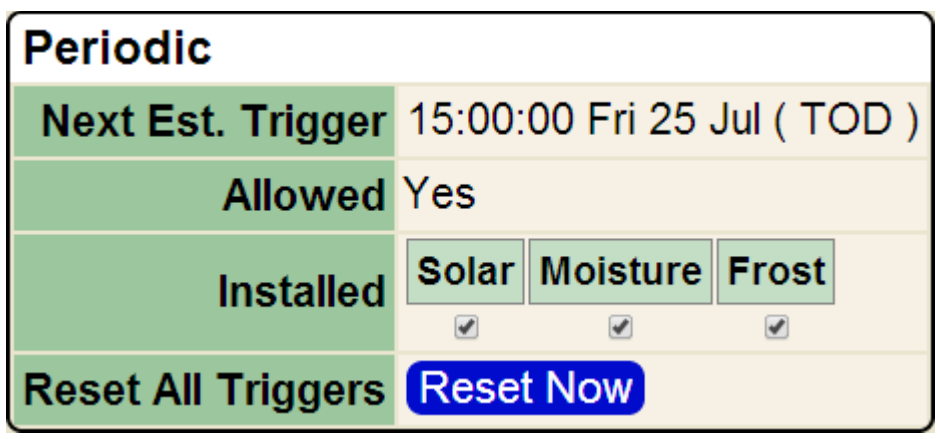
Enable: The trigger can be enabled to only allow triggers within certain time periods.

Periodic Triggers



Each group can have periodic triggers enabled under the settings tab, when this is set an additional tab will be displayed in order to configure them. A periodic trigger is something that is deemed to happen multiple times a day, a certain temperature has been reached, a certain amount of solar has been received.

Periodic



Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

Allowed: Is a periodic trigger allowed, this is controlled by the Minimum timer function of the periodic triggers if this is disabled or the time has

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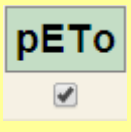
expired this reading will say Yes, otherwise the time remaining will be displayed.

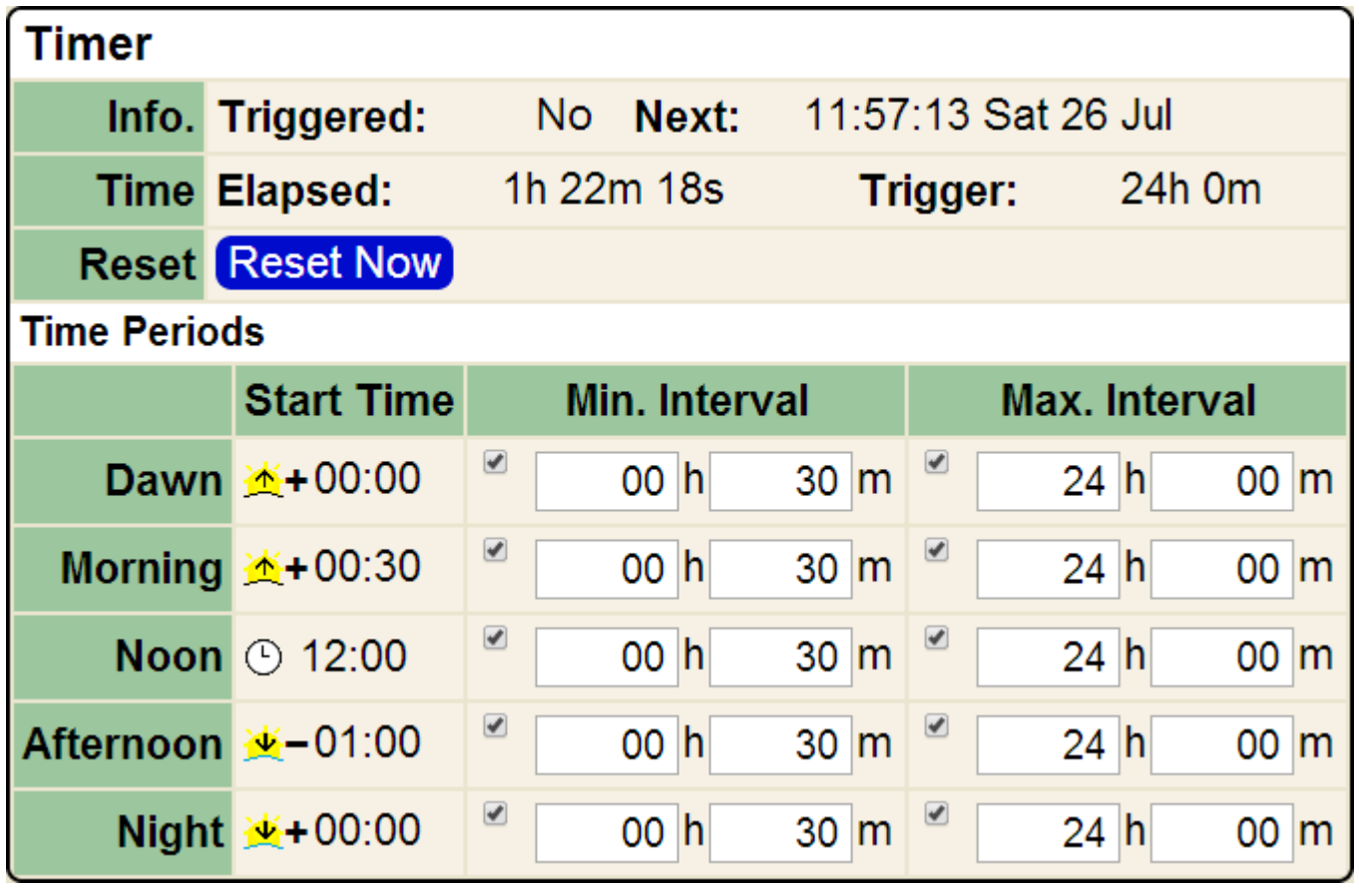
Installed: The Multigrow system supports up to 3 different periodic trigger sources with the option of adding a four if configured in a certain way. Ticking and activating these boxes will reveal separate settings boxes in which each of these can be configured.

A additional periodic trigger can be installed in the system if a pETo group is being used. The additional box shown below will be displayed if this option is available.



Reset All Triggers: Pressing the reset now button will make it seem like a trigger has occurred to the periodic counters installed on the system. This can be useful when delaying but not completely stopping periodic triggers.

Timer


Timer
Info. Triggered: No Next: 11:57:13 Sat 26 Jul
Time Elapsed: 1h 22m 18s Trigger: 24h 0m
Reset Reset Now
Time Periods
Start Time
Min. Interval
Max. Interval
Dawn +00:00 00 h 30 m 24 h 00 m
Morning +00:30 00 h 30 m 24 h 00 m
Noon 12:00 00 h 30 m 24 h 00 m
Afternoon −01:00 00 h 30 m 24 h 00 m
Night +00:00 00 h 30 m 24 h 00 m

The periodic timer lets you specify a minimum time between irrigation as well as a maximum time for each group in the system. Note that if a minimum time is set all other periodic triggers are held off by this. Time of Days and manual triggers ignore this setting.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the Max interval is disabled there will be no next trigger predicted.

Time: Current time that has elapsed since the last trigger for the group. This will be since any trigger not a just a time trigger. Trigger time for the timer, if a max interval timer is disable for the time period this will be left blank.

Reset: Pressing the reset now button will clear the elapsed time back to zero, this will cause the periodic triggers to wait the minimum time again as well as push back the max time out trigger. This is to hold off periodic triggers.

Min. Interval: Each time period has it's own minimum time out settings for greater control. Ticking the Min. Interval tick box will reveal a time box field where the hour and minutes of the minimum interval can be set. Once the elapsed time exceeds this value periodic triggers are allowed to execute.

Max. Interval: Each time period has it's own maximum time out settings for greater control. Ticking the Max. Interval tick box will reveal a time box field where the hour and minutes of the maximum interval can be set. Once the elapsed time exceeds this value a Time Out trigger will be executed.

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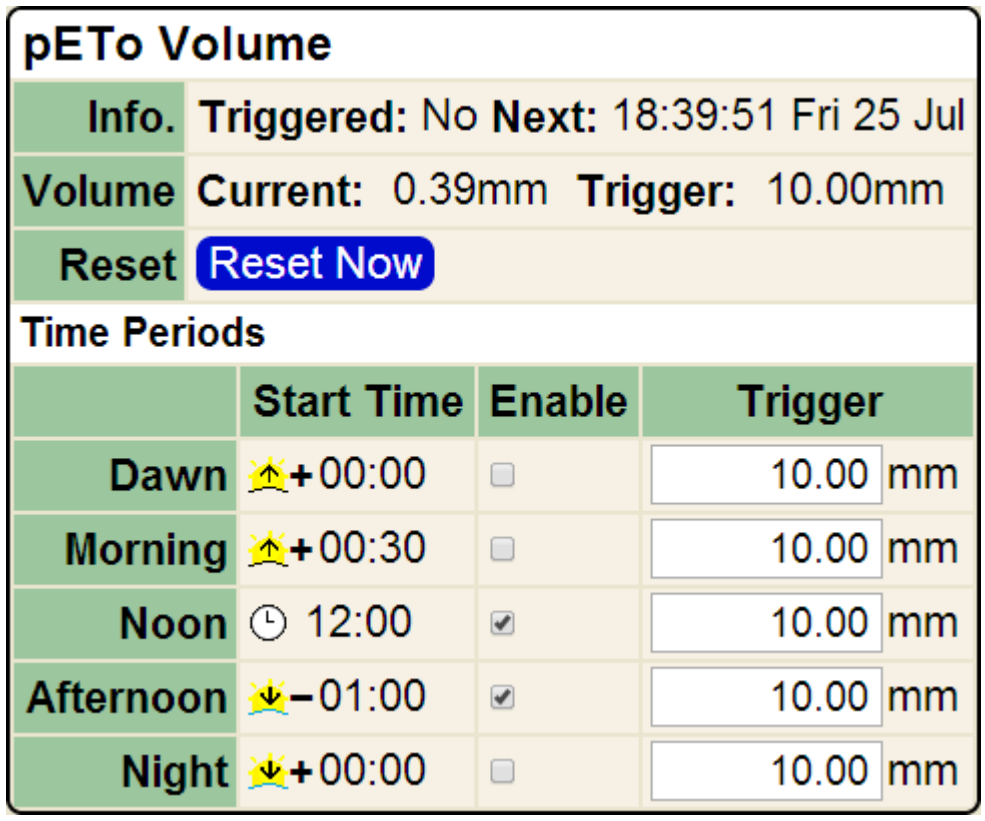
pETo Volume



If a group is configured to use pETo Volume the trigger can be configured here. Each group within the system can have a different pETo trigger. The pETo volume accumulator needs to be properly configured in order for this trigger to work, please refer to the pETo configuration section below for more information on this.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

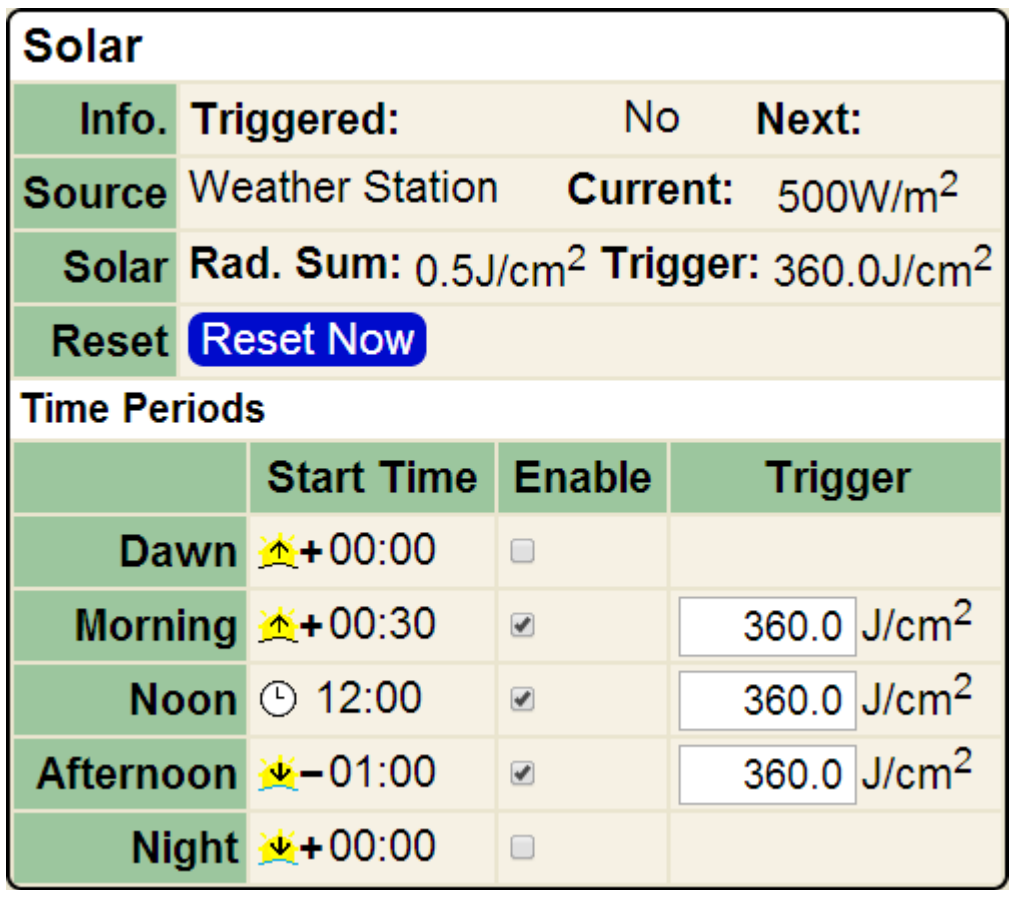
Volume: The current accumulated volume being measured by the group and the current trigger level are displayed here. If the trigger is not enabled the this time period the trigger value will be empty.

Reset: Pressing the reset now button will clear the accumulated volume back to zero.

Enable: Enable a pETo accumulated volume trigger for this time period.

Trigger: Desired trigger level for the time period. Note this value is not visible until the enable is saved.

Solar



A solar trigger lets you specify a accumulated solar level in which the group will be irrigated at, for each group in the system. Note that if a minimum time is set all this triggers will be held off until this time elapses. A valid solar source also needs to be available and configured for the group for this

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trigger to be used. Note the default value for this trigger is 360J/cm^2 this is the average amount of solar radiation accumulated over 1 hour of direct sunlight, during the middle of the day in summer for New Zealand. During winter this number is usually about a third of this 120J/cm^2, or a trigger time of 3 hours instead of 1.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

Source: Current source configured on the group this is set under the settings tab for each group. The current solar radiation value of this source will also be shown here.

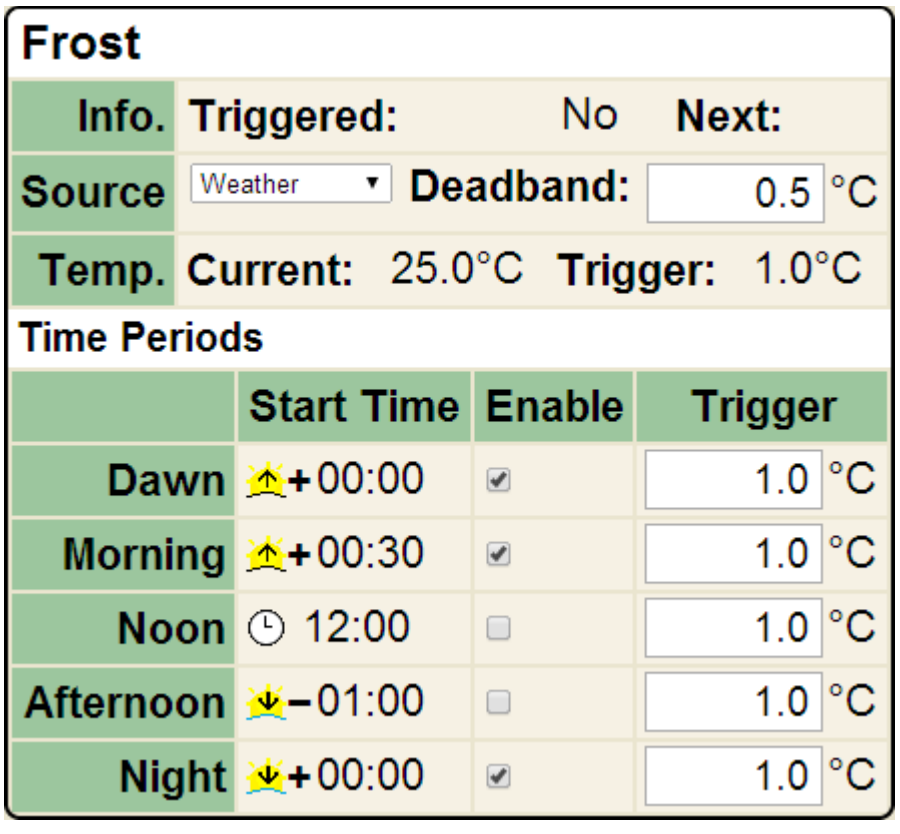
Solar: Current accumulated solar for the group since the last irrigation trigger. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Reset: Pressing the reset now button will clear the accumulated solar back to zero.

Enable: Enable a periodic solar trigger for this time period.

Trigger: Desired trigger level for the time period. Note this value is not visible until the enable is saved.

Frost



During cold times of the year it is possible to configure a group to have a temperature based trigger in order to protect crops from frost. A valid temperature source needs to properly configured for this trigger to operate correctly. It is important to note that while the temperature is below the trigger point an irrigation will be constantly request for this group and will not clear until the temperature rises above the trigger level plus the deadband offset. Because of this it is recommended to use the Min. Interval timer in conjunction with the frost triggers, to insure an appropriate time between irrigation occurs.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

Source: The temperature source this trigger uses as well as the deadband level for the clearing of the trigger.

- ***Weather:*** The frost trigger uses the temperature provided by the weather station.
- ***Independent:*** The frost trigger will use an independent temperature sensor as its source.

Note: If a independent sensor is being used when this option is selected and saved an address box will become visible. The address of the sensor must be entered here. The first box is used to specify the rotary switch address of the device and the second is used to specify whether to use Temperature Probe 1 or 2 (T0 or T1) connected to the device.

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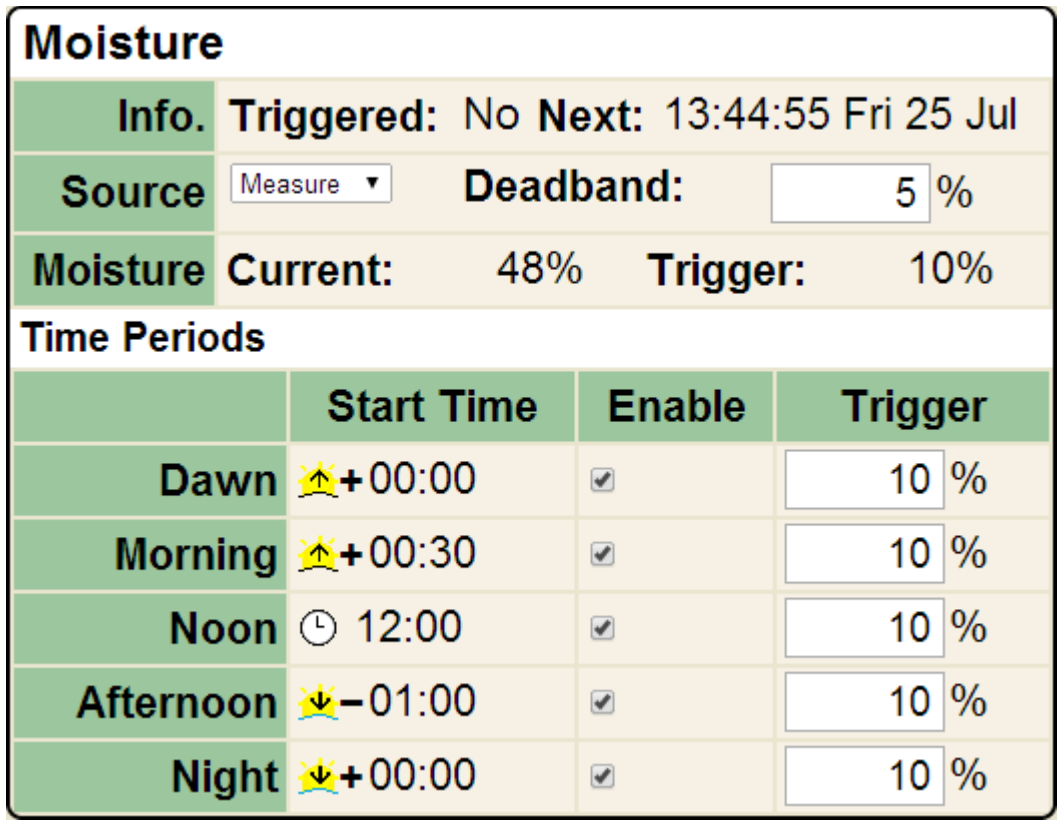
Temp.: Current temperature of the specified source. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Enable: Enable a periodic frost trigger for this time period.

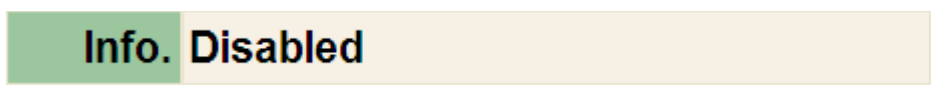
Trigger: Desired trigger level for the time period. This is the minimum temperature before a trigger occurs, the temperature source must drop below this for a trigger to occur. Note this value is not visible until the enable is saved.

Moisture



It is possible to configure a group to trigger based on a moisture level reading from a specific device. A valid moisture source needs to properly configured for this trigger to operate correctly. It is important to note that while the moisture is below the trigger point an irrigation will be constantly request for this group and will not clear until the moisture level rises above the trigger level plus the deadband offset. Because of this it is recommended to use the Min. Interval timer in conjunction with the frost triggers, to insure an appropriate time between irrigation occurs.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.



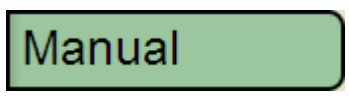
Source: Defines exactly where the moisture input is coming from, this trigger can be activated from any of the three local system sensors. The deadband level for the clearing of the trigger is also set here.

Moisture: Current moisture level of the specified source. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Enable: Enable a periodic moisture trigger for this time period.

Trigger: Desired trigger level for the time period. This is the minimum temperature before a trigger occurs, the temperature source must drop below this for a trigger to occur. Note this value is not visible until the enable is saved.

Manual



It is possible to configure a group to have a manual watering plan. Enabled this option under the settings tab will reveal the manual tab. Here the members of a group can be reorder, missed or individually water. This is useful when dealing with crops with irregular watering cycle, or greater control over individual stations within the system.

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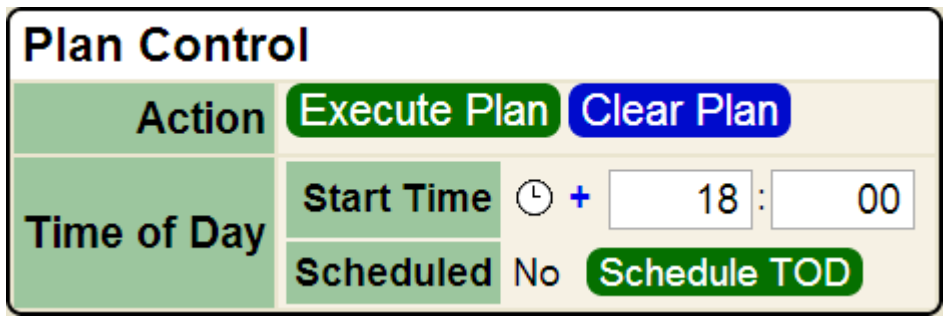
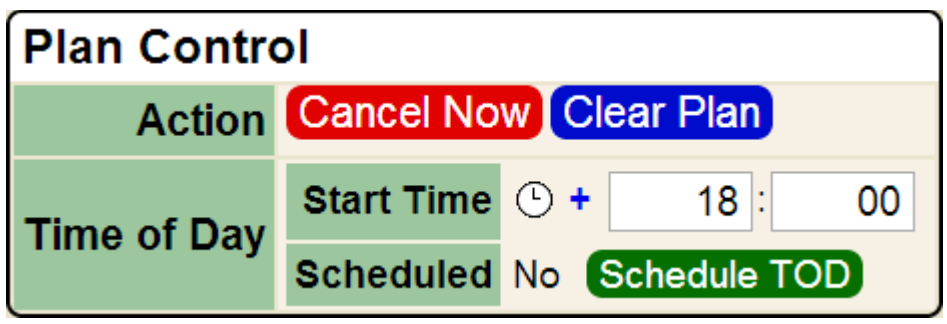
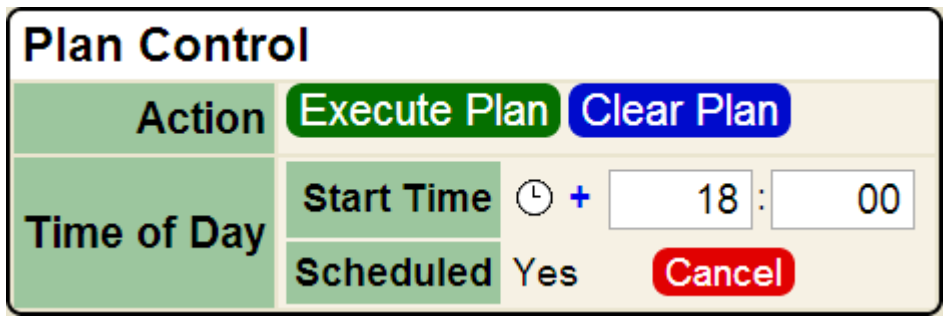
Plan Control

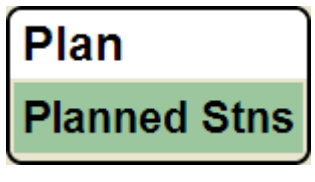


A watering sequence that is manually created is called a Plan, in this box a created plan can be Executed, Cancelled or Cleared. A plan can also be scheduled to run at a certain time of day. This time of day trigger works the same as the manual time of day triggers under the Automatic tab. It will queue a single time of day trigger once this is processed it will then need to be re-scheduled to trigger again (it will not happen automatically). Note that this manually schedule time of day will ignore any days of the week setting than might be configured on the group.

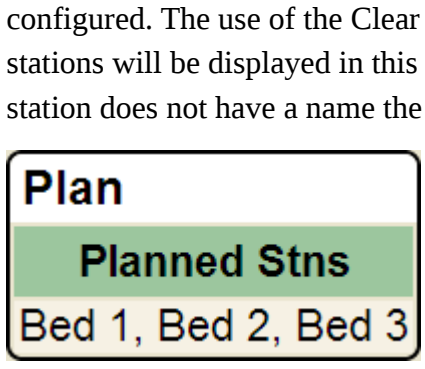




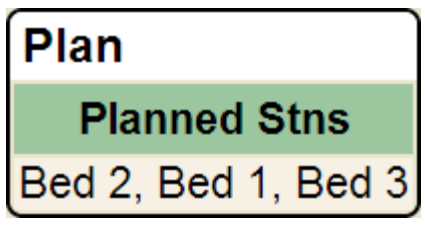
Plan



This holds the current watering plan for the members of the group, once the plan has been watered it will not reset it will stay how is was last configured. The use of the Clear Plan button in the Plan Control settings box must be used to clear the currently configure plan. The name of the stations will be displayed in this list and the order of how they will be watered members can be added out of order from the normal watering plan. If a station does not have a name the station number will be displayed instead.

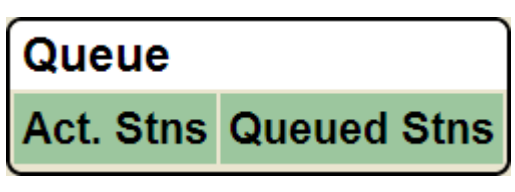


This plan will water Bed 1, Bed 2 then Bed 3.



This plan will water Bed 2 first; then Bed 1, then 3.

Queue



A queue is the current state of the plan being executed. Stations that are active will be shown under the Act. Stns box and stations waiting to be

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executed under the Queued Stns box. If a stations is manually executed while a plan is running it will be added to the end of the Queue.

For example if we are executing the first Plan above.

Queue

Act. Stns	Queued Stns
Bed 1	Bed 2, Bed 3

Bed 1 is currently active with Beds 2 & 3 waiting, after Beds 1 & 2 have run we decide to run Bed 4 manually this will add the stations to the end of the Queue

Queue

Act. Stns	Queued Stns
Bed 3	Bed 4

Members

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Add	Now	Waiting
2	Bed 2	01 m 00 s	Add	Now	Waiting
3	Bed 3	01 m 00 s	Add	Now	Waiting
4	Bed 4				Disabled

Members operate similarly to the stations page, however members cannot be added or removed here. A manual plan can only exist of members already assigned to the group. Here stations can be added/removed from a plan or triggered manual. The state of the station is also shown here. If a station is disabled under the configuration page it will also be **Disabled** here unable actioned.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Now	Planned
3	Bed 3	01 m 00 s	Remove	Now	Planned
4	Bed 4				Disabled

When a member is added to the plan the field will be updated here you can see the plan button has changed from Plan to Remove pressing this button now will take the member out of the current plan. The State has also changed from **Waiting** to **Planned** indicating this member is in the plan.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Cancel	Running
2	Bed 2	01 m 00 s	Remove	Cancel	Queued
3	Bed 3	01 m 00 s	Remove	Cancel	Queued
4	Bed 4				Disabled

When a manual plan is executed the field are updated again. Since the member is already planned for watering it is unable to be individually triggered anymore. However pressing the Cancel button will remove the stations from the queue or stop it from running if it is currently active. Pressing the

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Cancel button will not remove it from the plan, similarly pressing the remove button will only take it the member out of the Plan it will not remove it from the Queue. The state here has changed from **Planned** to **Queued** or to **Running** if the station is active.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Cancel	Running
3	Bed 3	01 m 00 s	Remove	Cancel	Queued
4	Bed 4	01 m 00 s	Add	Now	Waiting

After a stations in the plan has completed it will return back to it's **Planned** state if in the plan or **Waiting** if it was manually triggered.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Now	Planned
3	Bed 3	01 m 00 s	Remove	Cancel	Running
4	Bed 4	01 m 00 s	Add	Cancel	Queued

If a station is not in the plan but manually trigger it will be added to the queue.

pETo Volume

pETo Vol.

pETo Vol. is reading derived from four major environmental readings in order to estimate an approximate Evapotranspiration volume (ETo) for a crop. The Evapotranspiration is a combination of both the evaporation and transpiration of the area it can be useful in determine exactly how much water the plant has lost. The pETo Volume uses accumulated solar, wind speed and vapor pressure deficit (VPD) to estimate the positive volume of the ETo and rainfall to negatively offset it. The option for using pETo Volume is found under the settings tab for a group and must be ticked and applied before this tab is visible.

General

General

Total pETo Volume	0.17mm
Effects	Solar: + 0.14mm Wind: + 0.03mm VPD: + 0.00mm Rain: - 0.00mm
Last Irrigation	11:23:08 Fri 25 Jul
Reset	Reset Now

Total pETo Volume: Total volume measured since the last irrigation. This is the volume that is used to drive pETo triggers under the periodic trigger section of the group.

Effects: A quick overview of the effects each individual reading is currently having on the total volume.

Last Irrigation: Time of the last irrigation for the group.

Reset: Pressing the Reset Now button will clear the pETo volume to 0.00mm

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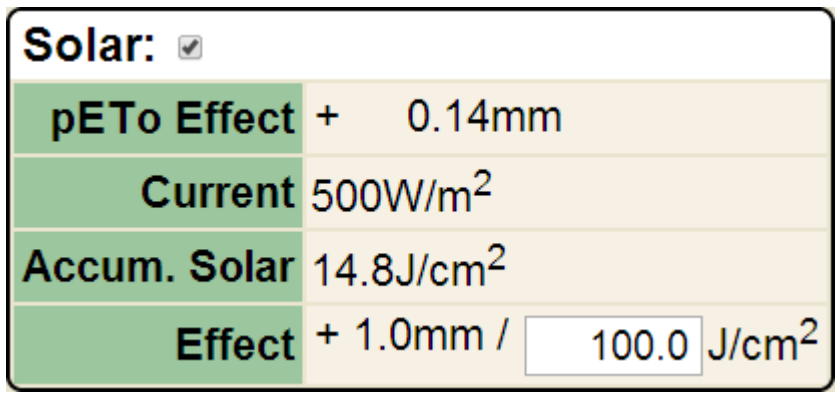
Solar



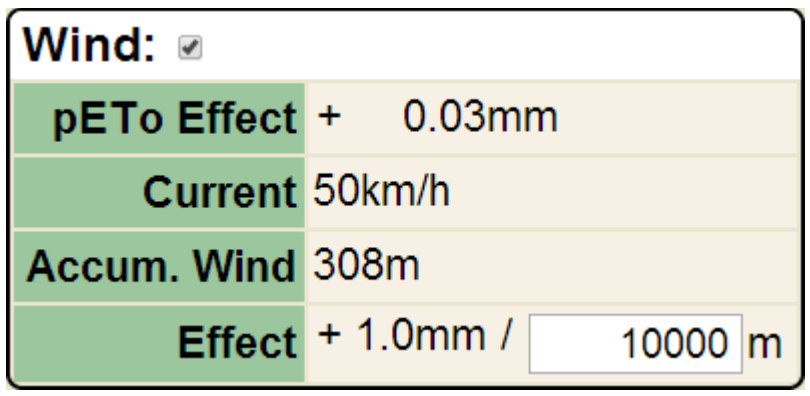
pETo Effect: In order for the solar to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated solar will have.

Current: The current solar being measured. This value is feed from the group solar configured on the settings page.

Accum. Solar: The current accumulated solar radiation since the last irrigation.

Effect: How the accumulated solar will affect the pETo volume. This value is proportional so will be calculated even if the current accumulated volume has not been reached. As you can see above the accumulated radiation is 14.8J/cm^2 with the current setting of 1.00mm / 100.0J/cm^2 this equates to 0.14mm.

Wind



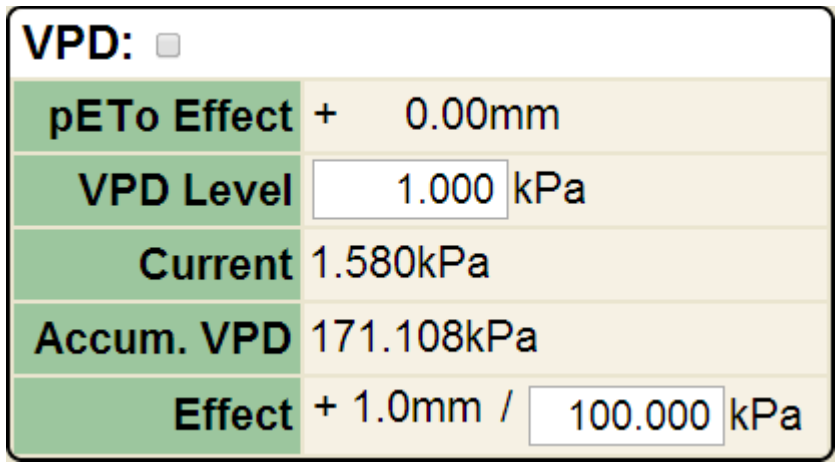
pETo Effect: In order for the wind to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated wind will have.

Current: The current wind being measured. This value is feed from the weather stations and this must be properly configured in order for this to work.

Accum. Wind: The current accumulated wind since the last irrigation.

Effect: How the accumulated wind will affect the pETo volume. This value is proportional so will be calculated even if the current accumulated volume has not been reached. As you can see above the accumulated wind is 308m with the current setting of 1.00mm / 100000m this equates to 0.03mm.

Vapor Pressure Deficit (VPD)



pETo Effect: In order for the VPD to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated VPD will have.

VPD Level: Since the VPD is a constant reading it is only necessary to accumulate it once it has reached a significant level. As the it rises the air can carry more vapor which aids evaporation. Once the VPD reaches the level set here it will being to accumulate in order to give a better representation of how

Current: The current VPD being measured. This value is feed from the weather stations and this must be properly configured in order for this to work.

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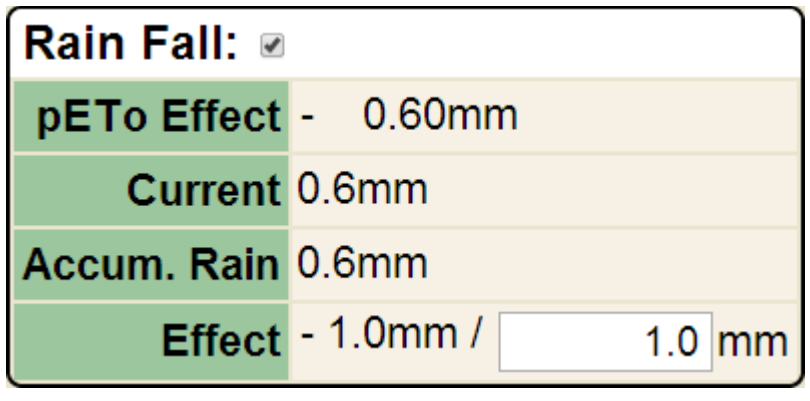
Accum. VPD: The current accumulated VPD since the last irrigation that has been above the set VPD Level.

Effect: How the accumulated VPD will affect the pETo volume.

Rain Fall



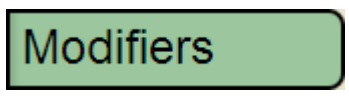
pETo Effect: In order for the rain to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated rain will have.

Current: The current rain fall since midnight. This value is feed from the weather stations and this must be properly configured in order for this to work.

Accum. Rain: The current accumulated rain fall since the last irrigation. Note that the Current is reset at midnight whereas the Accum. Rain is reset on irrigation so it is possible for these values to differ.

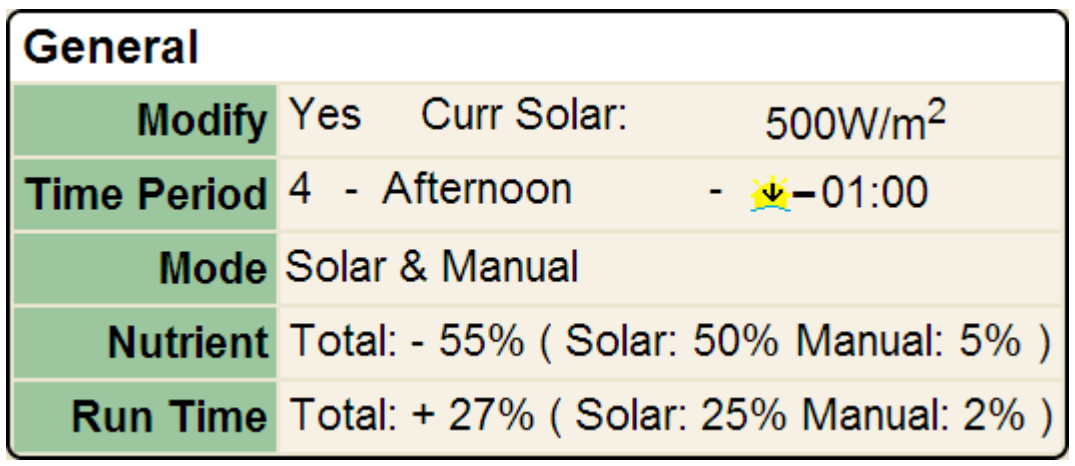
Effect: How the accumulated rain will affect the pETo volume.

Modifiers



Modifiers can be installed in a group to modify the stations run times or nutrient targets if applicable. This option must be enabled on the settings tabs for the group in order to make this tab visible.

General


General
Modify Yes Curr Solar: 500W/m2
Time Period 4 - Afternoon - 01:00
Mode Solar & Manual
Nutrient Total: - 55% (Solar: 50% Manual: 5%)
Run Time Total: + 27% (Solar: 25% Manual: 2%)

Modify: Are modifiers currently needs and the what is the current solar reading this decision is based on.

Time Period: Current active time period, the number, name and start time are listed in this field.

Mode: Current modifier mode configured for this time period.

Nutrient: Total current nutrient modifier and break down of each component. Note if the group is installed on a system with out dosing this modifier will be hidden.

Run Time: Total current stations run time modifier and break down of component.

> Example: If we are trying to irrigate the following group;
> **Group:** Beds 1 & 2
> **Target:** 1.00mS/cm^2
> **Members:**
> * Bed 1 Run Time: 1m00s
> * Bed 2 Run Time: 2m30s
>
> With the current modifiers listed above the resulting settings will be;

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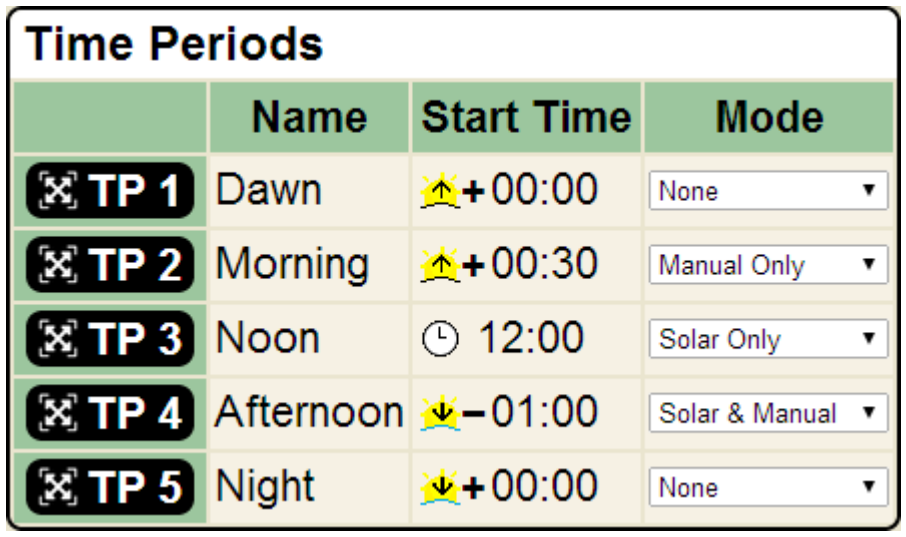
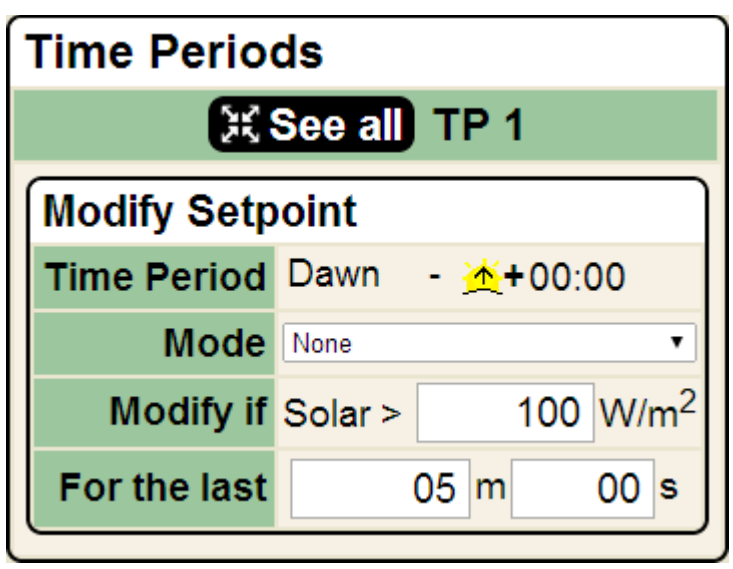
Group: Beds 1 & 2
Target: 0.45mS/cm^2
Members:
* Bed 1 Run Time: 1m16s
* Bed 2 Run Time: 3m10s

Time Periods



Modifiers are time period based settings this is a brief overview of what mode the modifiers are configured for in each one, as well as the name and start time of the particular time period. Pressing the expansion icon on each period will bring up additional modifier settings.

Time Period - Modify Setpoint



On expansion of each time period modifer settings will be displayed. Note that depending on the mode of the time period the information displayed might vary.

Time Period: Current time period name and start time.

Mode: The mode of the modifiers within this time period.

- ***None:*** No modifiers are allowed during this time period.
- ***Manual Only:*** Only manual modifiers are allowed.
- ***Solar Only:*** Only solar modifiers are allowed.
- ***Solar & Manual:*** Both solar and manual modifiers are allowed.

Modify if: This box set the level the solar intensity must reach in order for solar modifiers to be applied. The solar group solar reading is the source this is checked against. This must be properly configured under the group settings tab.

For the last: The solar level must be at this intensity (consistently) for at least this length of time before solar modifiers can be applied.

Modify

The modify box holds the actual modifier settings for the run time and nutrient target of the group. Depending on how the system and time period modify is configure this box may vary in appearance. If the mode has been set to none, this box will not be visible.

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Modify

Modify	Solar					Manual	
Nutrient Target	-	10	% /	100	W/m^2	-	5 %
Station Run Time	+	5	% /	100	W/m^2	+	2 %

The above box contains both nutrient target and run time modifiers as well as both solar and manual modifiers.

Modify: States what variable the modifier will be applied to.

Solar: Current solar modifier, note that in the example a solar intensity of at least 500W/m^2 is needed in order to allow modifiers. Here the Nutrient modifier is set to 10% / 100W/m^2 this mean when the intensity is reached for the desired amount of time, a 50% modifier will be applied. The modifiers are not proportional it will required a further 100W/^{2} before another 10% is added.

Manual: Manual modifiers are always added to the variable regardless of solar level so for the example above the nutrient target will modified by -5% and each stations run time by +2% while the system is in this time period.

Additional Modify layouts

Modify

Modify	Manual	
Nutrient Target	-	0 %
Station Run Time	+	0 %

Manual modifiers only.

Modify

Modify	Solar				
Nutrient Target	-	5	% /	100	W/m^2
Station Run Time	+	2	% /	100	W/m^2

Solar modifiers only.

Modify

Modify	Solar					Manual	
Station Run Time	+	0	% /	100	W/m^2	+	0 %

Solar & Manual modifiers on a none dosing system.

Settings

Settings

The setting tabs contains all the configuration for each group within the system.

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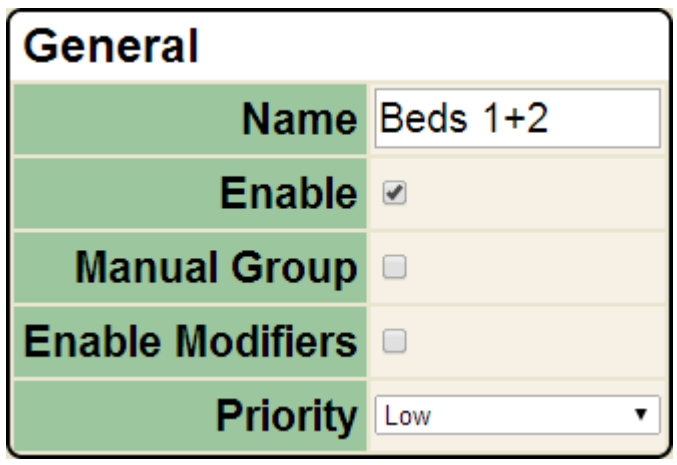
General



Name: Name of the group, this should be keen unique as it is used for identification purposes elsewhere in the system. If this field is left blank the groups number will be used.

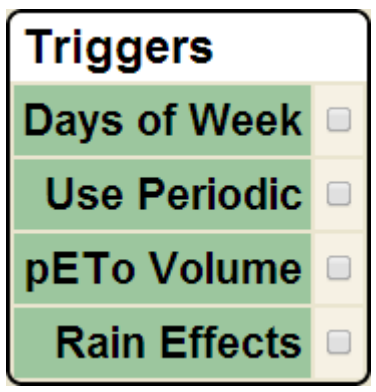
Enable: Where this group is enabled, this is the same setting as the enable on the main group tab. If not ticked this group cannot be triggered.

Manual Group: This will set the group to operate as manual group an additional tab will become available on the left hand side group menu. This will also change the Triggers tab label to Automatic to avoid confusing when configuring.

Enable Modifiers: This will enable modifiers to be used on the group. An additional tab will become available where these can be configured.

Priority: The Multigrow system has two levels of group priorities, setting this to high means that if this group is triggered it will interrupt any low priority running groups. Not a low priority group cannot interrupt a high priority group and a high priority group cannot interrupt another high priority group.

Triggers



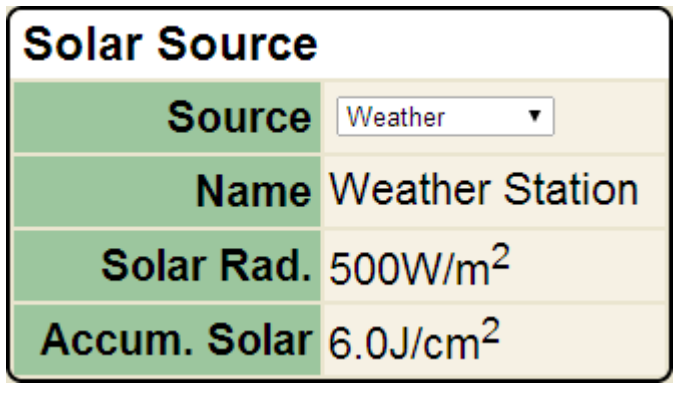
Days of Week: Ticking this box will enable you to select days of the week when this specific group can run. This effect all triggers except for Manual ones.

Use Periodic: If the group is to be triggered from periodic source such as solar, timer, etc. This box must be ticked an additional tab will become available where these triggers can be configured.

pETo Volume: If the group is use pETo triggers, this box must be ticked an additional tab will become available where this can be configured. Also additional options under the periodic triggers to use the pETo volume will become available.

Rain Effects: Does rain effect how this group irrigates.

Solar Source



Each group can have it's own solar source configured, this is to be used in conjunction with the periodic solar trigger as well as solar modifiers.

Source: Source of the solar reading for the group.

- ***System:*** The solar information configured for the irrigation system is also used as this groups solar source.
- ***Compartment:*** A climate compartment solar reading is to be used as the groups solar source.

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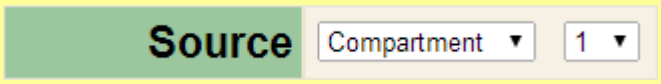
- ***Weather:*** The weather stations is the source of the solar reading this group will use.

If a compartment source is being used an additional setting box will be displayed this must be set to the number of the compartment the desired solar reading is coming from.

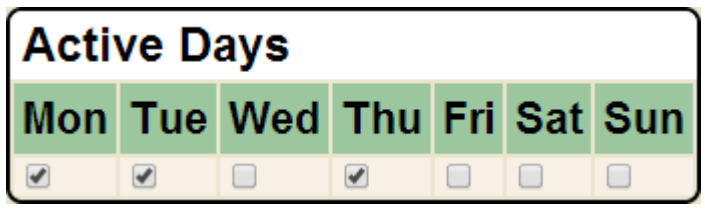


Name: Current name of the solar source, this will either be the name or number of the compartment, the current name or number assigned to the system or weather station.

Solar Rad.: Current solar radiation being reported from the solar source.

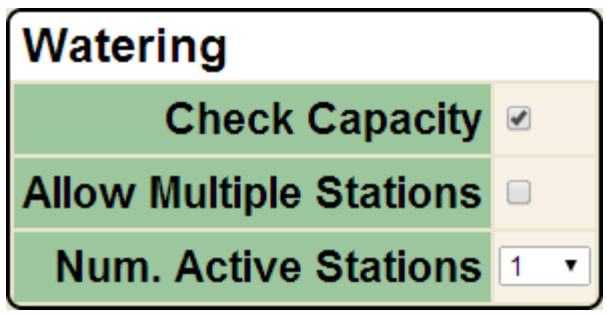
Accum. Solar: Accumulated solar the group has been exposed to since midnight.

Active Days



If the Days of Week tick box is selected under the triggers box this box will be displayed. With in it whatever days of the week the group is allowed to run can be specified. Ticking the box underneath a corresponding day means that the system will be able to run on those days. Note if have selected the Days of Week box but have not specified any days the system will not run. This will effect all automatic and periodic triggers, only manual triggers can be processed on inactive days. In the above example the group can only automatically trigger on Monday, Tuesday and Thursday.

Watering

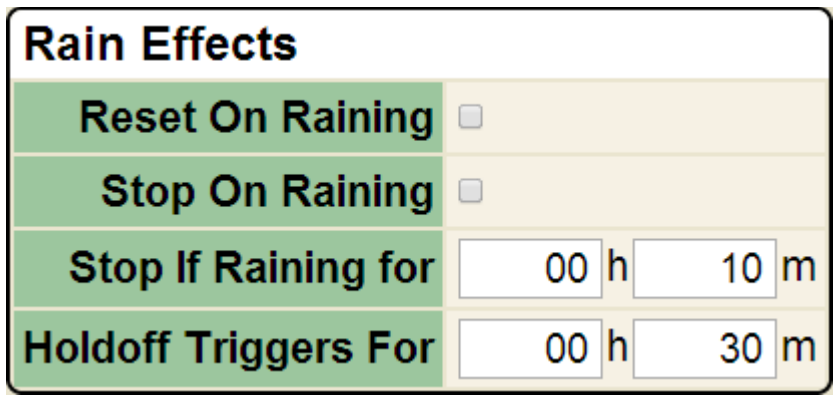


Check Capacity: If a group is set up to ignore capacity a station can run regardless of if there is adequate capacity through the pump. Unticking this box means that careful consideration and manual timing of stations needs to be used when multiple stations and concurrent groups are being used. It is advisable to leave this setting ticked and make sure the system capacity is properly set. If only one group and station is ever going to be run this setting is not really important as the system will always try to run at least one station even if it is over capacity.

Allow Multiple Stations: This will allow the group to run more than one station simultaneously this is useful if the pump capacity can easily provided enough water for multiple stations (zones).

Num. Active Stations: Set the number of stations that can be active at anyone time. The system will try to maintain this as long as the capacity isn't exceeded, unless the check capacity option is disabled.

Rain Effects



Is it possible for some group to contian stations that are directly exposed to rain. If this happens any periodic triggers for the system should reset. Also if the group is currently active and it start to rain the group can be stopped so water is not wasted.

Reset On Raining: Reset any periodic triggers that might be configured on the group.

Stop On Raining: Stop the group if irrigating and rain is detected.

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Stop If Raining for: An irrigation will only be stopped if it has been raining for an X amount time. This setting is only taken into account if the Stop On Raining setting is enabled.

Holdoff Triggers For: If either the Reset on Raining or Stop On Raining settings are enabled and rain is detected, the system will hold of all triggers once it has stop for this time to insure a irrigation is not triggered directly after it has stopped raining.

Info.

The Info. box located on this page is exactly the same as the one on the Stations page for a group, please refer to the Stations section above for more information on this readings box.

Readings

Groups Status

The groups page displays the above information but also changes colours depending on the current groups status the follow states and for are group are described below.

Groups Status

	State	Reason	Act. Count	Info	Last Sum	Rad. Sum	Trigger Level	Total Volume	Station	Action
All Beds	Off	User	1	16:38:35 Tue 19 Aug				55L		Irrigate Now
Grp. 2	Off	User	2	16:33:52 Tue 19 Aug	1.3J/cm^2	7.5J/cm^2	360.0J/cm^2	67L		Irrigate Now

Field	Description
State	Current state of the group
Reason	The last reason an action occurred on a group.
Act. Count	The amount of times the group has been active today.
Info	This will display the time when the group last changed state. If the group is active the Estimated Time remaining for its irrigation will also be displayed in this field.
Last Sum	If a group has solar triggers configured every time the group is triggered the current accumulated solar sum is recorded even if the trigger source was not a solar trigger.
Rad. Sum	The current level of the groups solar accumulator.
Trigger Level	The current trigger level of the group this will be displayed as XXJ/cm^2 if the trigger is displayed for the current time period.
Total Volume	The total volume the group has passed since midnight, this is based on the stations within the groups flow rates.
Station	When a group is active the current stations being irrigated will be displayed here along with their run times and the option to skip. If the group is set up to run multiple stations at once all active station will be displayed here.
Action	This field holds the User Action buttons for a group depending on the current state of the group the buttons displayed here will vary.

If a system is configured as inline an additional field will be present for every group called Correction Factors. Here the current corerection factors for both the nutrinet and pH dosing modules are displayed.

Correction Factors
Nutrient: 100% pH: 100%

Disabled

Disabled	Solar	8	10:42:21 Wed 20 Aug	9.1J/cm^2	0.6J/cm^2	9.0J/cm^2	1890L		

If a group is disabled on the Settings -> Groups main overview the group will become grey, this will also remove any action buttons from the group. A disabled group cannot be trigger by any means even manually it must be enabled first. If the solar trigger was is enabled on a disabled group all the relative solar information will still be displayed and the Rad. Sum will still be accumulated by the group.

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Off

Off	Time Out	5	10:19:31 Wed 20 Aug	3.6J/cm^2	8.3J/cm^2	9.0J/cm^2	1575L		Irrigate Now

When a group is inactive all relative information for the group is displayed, the only valid action from an off group is to manually Irrigate Now. The reason and info listed in an off group are the information from the last irrigation for the group.

Pending

Pending	User	6	10:30:35 Wed 20 Aug	0.7J/cm^2	0.7J/cm^2	9.0J/cm^2	1587L		Clear Pending

If a group is triggered by cannot run yet because maximum number of groups or system capacity has been reached the group will become pending. WHen this occurs the group will turn a light blue to indicate this, when a group is pending it can be manually cleared by pressing the Clear Pending button now visible in the action field.

Pending (Batch System)

Pending Filling	User	0	16:32:10 Tue 19 Aug	16.9J/cm^2	17.0J/cm^2	360.0J/cm^2	0L		Clear Pending

When a group is trigger on a batch system the group must wait for the batch tank to be ready, this makes the group enter the pending state but being held off by the batching module. The group will turn a blueish colour to indicated this, the current state of the batching module will also be displayed in black underneath the Pending state message. Like a normal pending group these groups can also be cleared, note that if this happens the batching system will continue to run until a stable state is achieved. If the group is cleared the batch system will stop dosing but will continue to fill or complete a stir cycle if that was the operation it was doing, the tank will most likely be left in a waiting full state if this sequence occurs.

On

On	User	2	16:33:51 Tue 19 Aug ETR: 0h 0m 47s	1.3J/cm^2	0.1J/cm^2	360.0J/cm^2	35L		Name	Time Remaining	Skip	Pause Now
								Stn 1	Bed 1	0m 56s	Skip Now	Cancel Now

When a group becomes active it will turn green to indicated this, the state will also be updated to On. When a group becomes active the info box will be updated with the time of the trigger plus display the estimated time remaining for the group. Since a group has no knowledge of when it maybe interrupted or held of because of flow the time is only an estimate. The station field will also be populated with the active stations within the group. While a group is active the action button changes to Pause Now and Cancel Now these are the two valid options.

On (Multiple Stations)

On	User	9	10:45:19 Wed 20 Aug ETR: 0h 10m 25s	2.1J/cm^2	0.4J/cm^2	9.0J/cm^2	1913L		Name	Time Remaining	Skip	Pause Now
								Stn 1	Bed 1	9m 35s	Skip Now	Cancel Now
								Stn 2	Bed 2	0m 35s	Skip Now	

If a group has been setup to use multiple stations it will operate exactly the same as a single stations group. The stations field will just contain more enters for the number of stations the group is allowed to run. If the group does not or cannot run the maximum number of stations as allowed field will still be displayed.

	Name	Time Remaining	Skip
Stn 1	Bed 1	8m 41s	Skip Now
Stn 2		0m 0s	Skip Now

On (Pending)

On (Pending)	Time Out (Time of Day (Auto))	4	16:47:49 Tue 19 Aug ETR: 0h 5m 13s	0.8J/cm^2	3.9J/cm^2	9.0J/cm^2	280L		Name	Time Remaining	Skip	Pause Now
								Stn 1	Bed 1	5m 24s	Skip Now	Cancel Now
												Clear Now

A group may take a long time to finish a single irrigation cycle of all the groups configured. It is possible that since the time the group has started a new trigger has been requested for the group even though it is still active. If this happens the new trigger will be queued (Pending) until the group has finished running, once the group has finished irrigating it will then process the pending trigger and the group will start running again. In this state the

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(Pending) will appear under the on label, the reason for the pending trigger will also be displayed under the current active reason. The action field will also contain three buttons; Pause will pause the current active irrigating, Cancel will can the current active group (Note that the pending trigger will be processed once the group is cancelled) and Clear which will clear the pending trigger but not effect the current irrigation (Note a pending trigger cannot be cleared when a group is paused it must be resumed first).

If a second group has been pending before the first group generates a pending trigger the secondary group will become active before the current group is allowed to restart again.

Paused

Group Pause

Paused	User	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	5.8J/cm^2	9.0J/cm^2	312L		Name	Time Remaining	Skip	Resume Now
								Stn 1	Bed 1	4m 13s	Skip Now	Cancel Now

Once a group is running the Pause Now button becomes available pressing this will stop the current irrigation for that group and hold its current progression. This can allow another group to run or to fix a problem within an active group without having to restart the group. In this state the group will turn a light purple colour, the reason will become User and the stations within the group will be appended with (Paused). In this state the group can be resumed or cancelled using the appropriate buttons, Note if other groups are pending they will immediately start running once the active group is paused.

System Pause

Paused	Pump Error	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	7.0J/cm^2	9.0J/cm^2	322L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	8m 57s	Skip Now	

When a system pause occurs on with the irrigation system all active groups on the system will be paused it will also stop any additional groups from being triggered. When a system pause occurs the reason will be overwritten with the pause reason of system and the group will become a light purple colour.

System Pause (User)

Paused	System Pause	12	11:46:25 Wed 20 Aug ETR: 0h 11m 2s	3.3J/cm^2	3.3J/cm^2	9.0J/cm^2	2298L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	8m 34s	Skip Now	

A whole irrigation system can be manually paused on the Readings -> Status page this will cause all active groups to groups on the system to be paused. This will cause the group to change to light purple colour and update the reason of the group to system pause to indicate that this has happened. This differs from a group pause because no other groups on the system can run or be resumed only by resuming the whole system will groups become active again. It is possible however to cancel a paused group in this condition.

Interrupted

Interrupted	User	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	9.7J/cm^2	9.0J/cm^2	345L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	9m 9s	Skip Now	

It is possible for a group to be set up as a high priority group, if a high priority groups becomes active while a low priority group is irrigating the low priority group will be interrupted. When this happens the low priority group is paused until the high priority group has finished running. A group will only be interrupt if either the max number of active groups has been reached or the system capacity will be exceeded otherwise both groups will run concurrently. If a group is interrupt it will turn light purple the reason will also change to User.

Dosing

A batch system requires certain dosing components in order function correctly.

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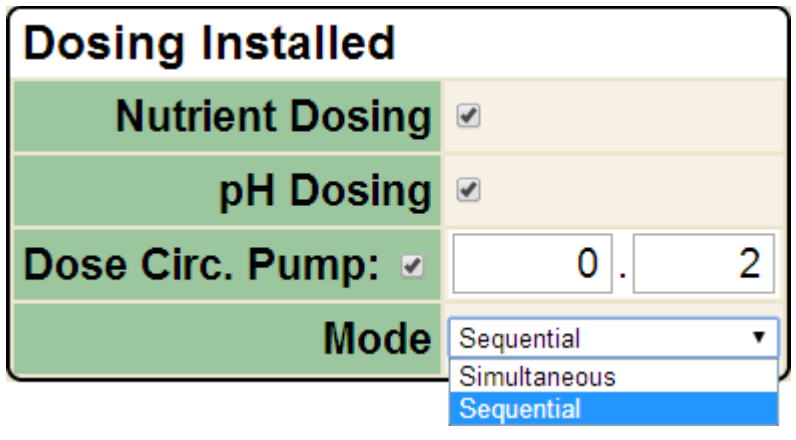
Install



Nutrient Dosing: This box must be ticked if nutrient dosing is to be used within the batch system.

pH Dosing: This box must be tick if pH correction is to be done on the batch system.

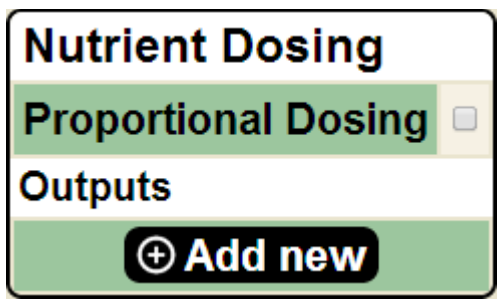
Dose Circ. Pump: Ticking this box will enable the use of a "Circulation Pump" to supply large volumes of nutrient/pH to the dosing valves. This will also enable an output expander address to be input.

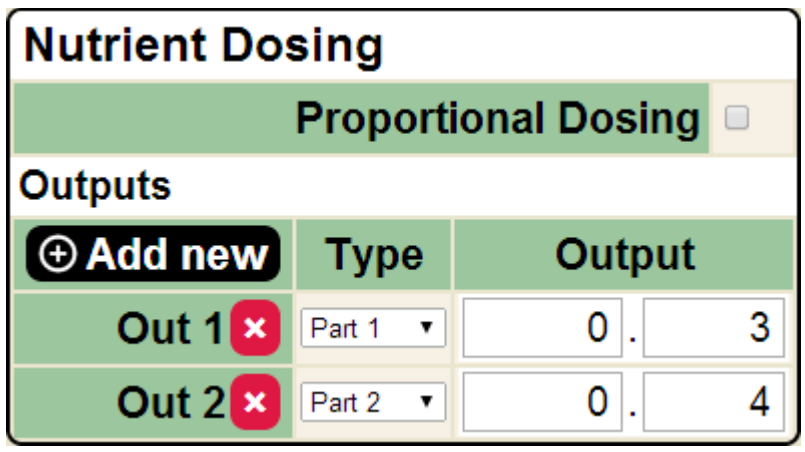
Mode: Controls how the Nutrient and pH dosing valves work together in the system. If all the dosing valves are wired on to the same output expander it is possible for them to all turn on at the same time. This may cause a large inrush of current which the output expander might not be able to handle.

- ***Simultaneous:*** Both the nutrient and pH dosing valves will act independently of each other.
- ***Sequential:*** Nutrient and pH dosing valves cannot operate at the same time.

Nutrient Dosing

If the Nutrient dosing has been installed the option for added nutrient dosing valves will become available. Each irrigation system can support up to 10 different nutrient parts, except for a watering system where no dosing can be installed.





Proportional Dosing: Proportional dosing means that the dose time for nutrient doses will change in relation to how far away from the target the current reading is.

Type: Once a valve is installed the type field can be seen, this is used to specify which Part of the nutrient mix this valve is physically connected to.

Output: Address of the output expander this valve is wired to, see section 3.1 configuring a single output for more information.

pH Correction

If the pH dosing has been installed the option for added dosing valves will become available. Each irrigation system can supports both raise and lower pH correction, except for a watering system where no dosing can be installed.

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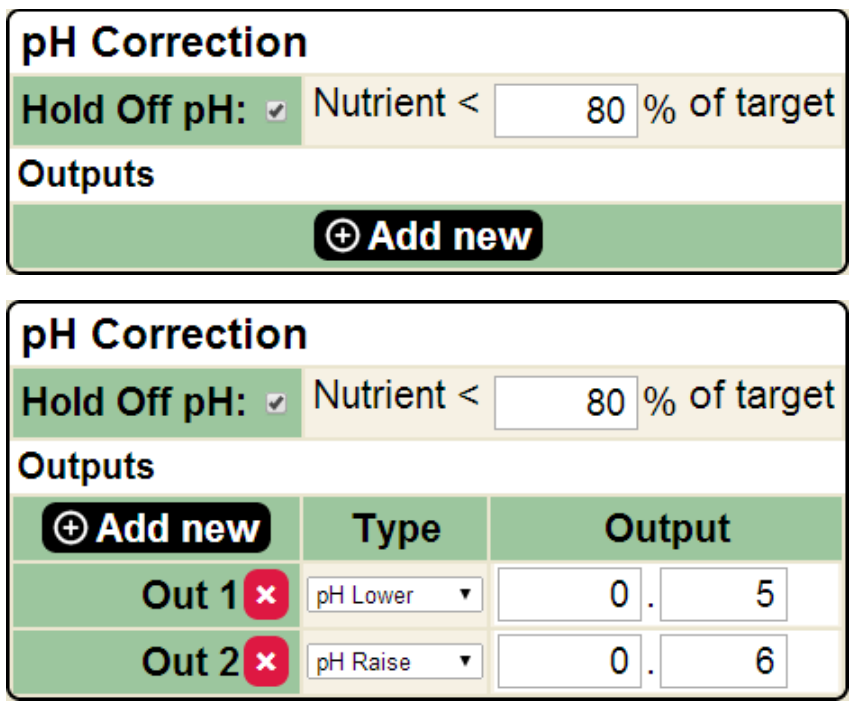


Hold Off pH: When nutrients are mixed into a tank they can have an effect of the pH of the water. It is recommended to hold off pH dosing until the nutrient level of the tank gets closer to the target at which point the nutrient dosing will ease off.

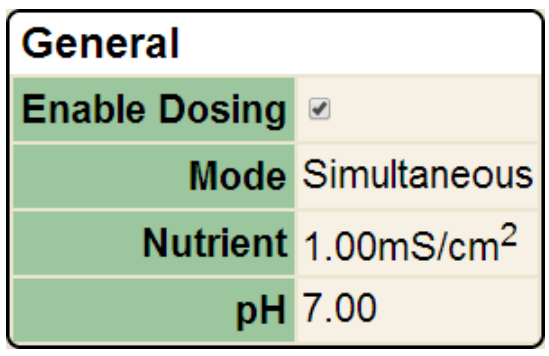
Type: Once a valve is installed the type field can be seen, this is used to specify which type of pH correction raise or lower this valve is physically connected to.

- ***pH Raise:*** When this output is driven Alkali will be dosed into the system raising the pH.
- ***pH Lower:*** When this output is drive Acid will be dosed into the system lower the pH.

Output: Address of the output expander this valve is wired to, see section 3.1 configuring a single output for more information.

Settings

General



Enable Dosing: An overall enable for the dosing system this must be ticked for both pH and Nutrient dosing to occur on the system.

Mode: Current dosing mode of the system.

- *Simultaneous:* Nutrient and pH valves can operate whenever they need to.
- *Sequential:* Nutrient and pH valves can operate at the same time.

Nutrient: Current nutrient reading for the system being provided by the Measure EpM sensor group.

pH: Current pH Reading for the system provided by the Measure EpM sensor group.

Dose Circulation Pump

A dose circulation pump is controlled by the individual dosing modules within the system and does not have any real setting of its own. The output can only be software overridden.

Override: Ticking the box will force the output to the state specified in the drop down box.

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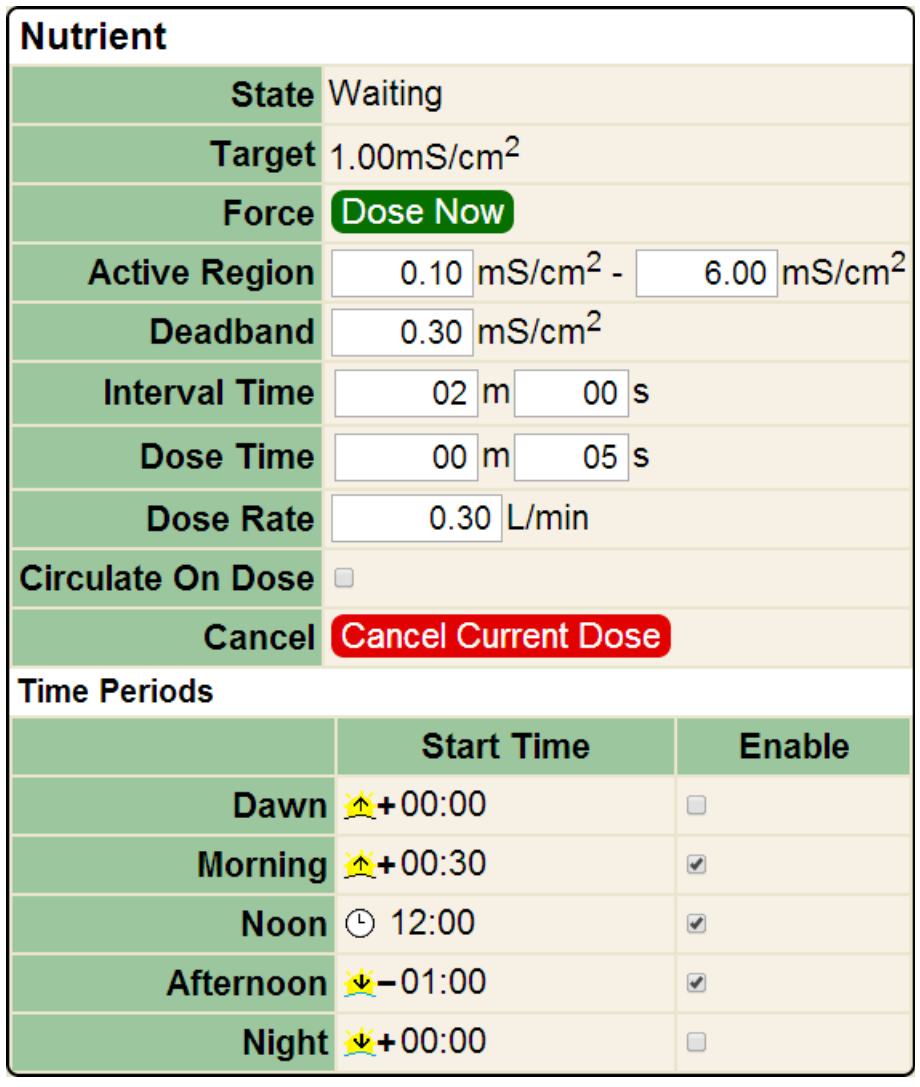
Nutrient



State: Current state of the nutrient dosing module.

Target: Current target the module is trying to achieve, this is specified in the program and can change per time period. If this reading appears as XX it means no program is currently being batched by the system.

Force: Pressing the Dose Now button force the nutrient module to turn on the dosing valves for the dose time specified, not that after a forced dose the module will enter the interval state in order to stop a normal dose happening directly after a forced dose.

Active Region: The active region is to try an stop overdosing if an error has occurred. The two settings are the lowest and highest value the nutrient can be and dosing can still happen. If the probe is no longer in water it will return a reading of zero, since the probe is not in the water it will be unable to detect the effects of a dose so it should not be done. A reading on the high should never be possible as the module will stop dosing when the target is reached, however if the probe has become faulty a high reading might occur. It is wise to set the upper region to a value 50% high than the target.

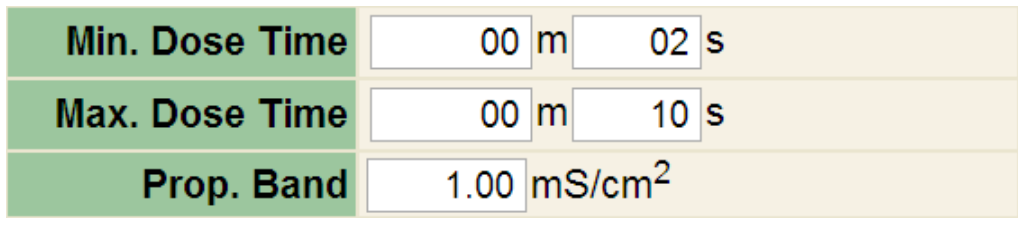
Deadband: Once the target is reached the dosing module will shut off, the level of nutrient must then drop below the target - the dead band in order for dosing to restart.

Interval Time: Once a single dose has occurred the module will enter the interval state. Once here it must wait for the time specified in this field before another dose can occur. The interval time is needed to insure that the the last doses effect has been fully reacted throughout the tank.

Dose Time: The dose time specifies how long the maximum time is a dosing valve will be on for. Using the example above if the current recipe calls for 100% of part A and 50% of part B, Dosing valve A will be on for 5 seconds where as valve B will be on for only 2.5 seconds.

Proportional Dose time

If the nutrient dosing has been configured for proportional dosing additional setting will be available.



Min. Dose Time: If a dosing valve is active it must be at least on for 2 seconds if dosing at 100%.

Max. Dose Time: A dosing valve cannot be on for longer the 10 seconds.

Prop. Band: The size of the proportional band the dose time will be scaled across in relation to the target and current reading.

Proportional dosing means the maximum on time for the dosing valves will change proportionally to how close to the target the current nutrient value is. This means that the further away from the target you are the more dosing will happen this allows the module to reach the target a lot faster than set

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time dosing. The proportional band is set to start from the target - deadband - prop band to the target - deadband.

Proportional Dosing Example:

- **Target:** 1.80mS/cm²
- **Deadband:** 0.30mS/cm²
- **Min. Dose Time:** 0m02s
- **Max. Dose Time:** 0m10s
- **Prop. Band:** 1.00mS/cm²
- *Calculated Proportional Band:* 0.50mS/cm² - 1.50mS/cm²

Current Reading	Calculate Dose Time
0.30mS/cm²	10s
0.50mS/cm²	10s
0.80mS/cm²	8s
1.00mS/cm²	6s
1.20mS/cm²	4s
1.50mS/cm²	2s
1.70mS/cm²	2s

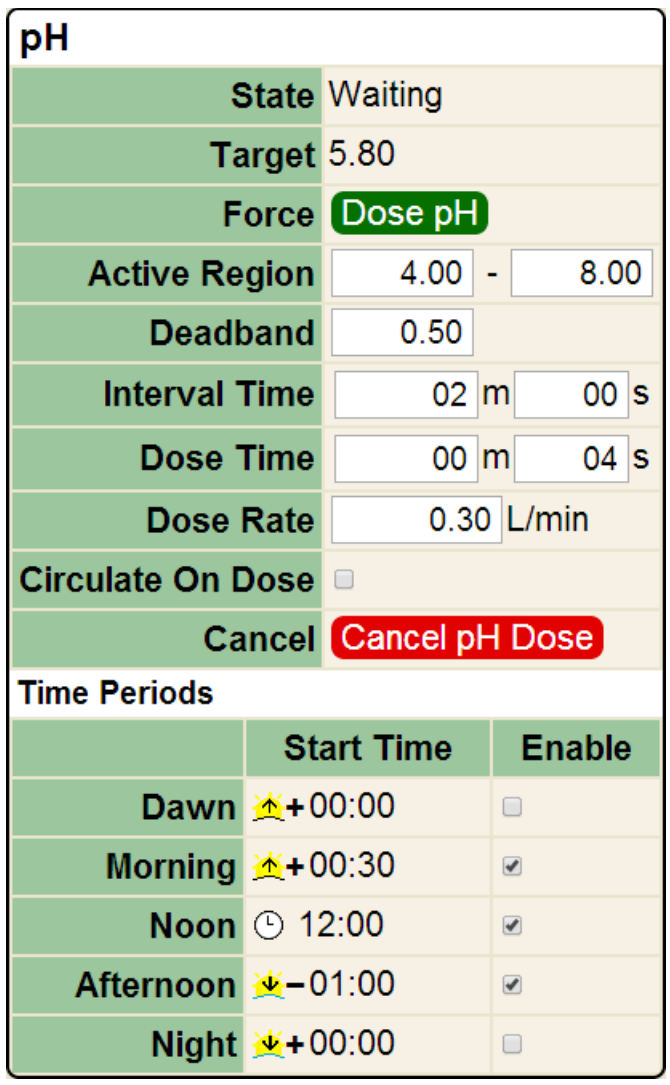
Dose Rate: Volume which is passed through the dosing valves if they are constantly on for a minute. This does not effect any control on the system it is used to calculate the volume of the nutrient the module has used per day.

Circulate On Dose: If this box is tick the circulation dose pump will be driven on when the nutrient dosing module is not in the waiting state. This option is only visible if a circulation pump has been installed on the system.

Cancel: Pressing the Cancel Current Dose will cancel any dose that is currently active on the module. Once cancelled the module will enter the interval state, if the system still required dosing it will start again after the interval state. This button merely cancels the active dose, to stop dosing completely the nutrient settings should be modified to insure dosing is no longer required or enabled.

Enable: Nutrient dosing can be enabled during different time periods to allow greater control of the module.

pH



State: Current state of the pH dosing module.

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Target: Current target the module is trying to achieve, this is specified in the program and can change per time period. If this reading appears as XX it means no program is currently being batched by the system.

Force: Pressing the Dose pH button force the module to turn on the dosing valves for the dose time specified, not that after a forced dose the module will enter the interval state in order to stop a normal dose happening directly after a forced dose.

Active Region: The active region is to try an stop overdosing if an error has occurred. The two settings are the lowest and highest value the pH can be and dosing can still happen. If the probe is no longer in water it will start to drift to either a high or low value this cannot be predicted for a pH probe. Since the probe is not in the water it will be unable to detect the effects of a dose so it should not be done.

Deadband: Once the target is reached the dosing module will shut off, the level of pH must then move outside the target +/- the dead band in order for dosing to restart. The pH deadband having a plus or minus offset is determined by the dosing mode specified in the program.

Interval Time: Once a single dose has occurred the module will enter the interval state. Once here it must wait for the time specified in this field before another dose can occur. The interval time is needed to insure that the the last doses effect has been fully reacted throughout the tank.

Dose Time: The dose time specifies how long the maximum time is a dosing valve will be on for.

Dose Rate: Volume which is passed through the dosing valves if they are constantly on for a minute. This does not effect any control on the system it is used to calculate the volume of the pH module has used per day.

Circulate On Dose: If this box is tick the circulation dose pump will be driven on when the nutrient dosing module is not in the waiting state. This option is only visible if a circulation pump has been installed on the system.

Cancel: Pressing the Cancel Current Dose will cancel any dose that is currently active on the module. Once cancelled the module will enter the interval state, if the system still required dosing it will start again after the interval state. This button merely cancels the active dose, to stop dosing completely the pH settings should be modified to insure dosing is no longer required or enabled.

Enable: pH dosing can be enabled during different time periods to allow greater control of the module.

Readings

Nutrient

Nutrient

Reading	0.21mS/cm^2
Target	1.00mS/cm^2
State	Waiting
Active Region	0.10mS/cm^2 - 6.00mS/cm^2
Mode	Simultaneous
Num. Of Doses	3
Dose Volume	0.075L
Dose Time	0m 15s

Outputs

	Type	Output State	Switch Pos.	Fuse
Out 1	Part 1	Off	Auto	OK
Out 2	Part 2	Off	Auto	OK

For this box to be visible nutrient dosing needs to be installed on the current irrigation system.

Field	Description
Reading	Current nutrient reading for the system based on the inputs from the Measure EpM sensor group.
Target	Current nutrient target set by the program, this is what the nutrient dosing module is trying to achieve on the system. Since the system can have a different program for each group when there is not a group active this will be reported as XXmS/cm^2, this is actually not an error unless the dosing system is suppose to be active.

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Field	Description
State	Current state of the module.
Active Region	Dosing is only allowed when the nutrient level is within this region this is to stop dosing when the probe is out of water or when the nutrient level is getting too high.
Mode	Current mode of the dosing system as defined on the configuration page, this can be *Simultaneous* or *Sequential*.
Num. Of Doses	Number of doses performed by the module since the last end of day on the system.
Dose Volume	Total volume the doses used today, this is based on the Dose Rate setting for the module.
Dose Time	Total time the pump has been active today, this is based on the Dose Time.
Outputs	
Type	What part this output has been configured to dose.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

pH

pH

Reading	6.87
Target	5.80
State	Interval
Active Region	4.00 - 8.00
Mode	Lower
Current Hold Off	0.80mS/cm^2
Num. Of Doses	1
Dose Volume	0.020L
Dose Time	0m 4s

Outputs

	Type	Output State	Switch Pos.	Fuse
Out 1	pH Lower	Off	Auto	OK
Out 2	pH Raise	Off	Auto	OK

For this box to be visible pH dosing needs to be installed on the current irrigation system.

Field	Description
Reading	Current pH reading for the system based on the inputs from the Measure EpM sensor group.
Target	Current pH target set by the program, this is what the pH dosing module is trying to achieve on the system.Since the system can have a different program for each group when there is not a group active this will be reported as XX, this is actually not an error unless the dosing system is suppose to be active.
State	Current state of the module.
Active Region	Dosing is only allowed when the pH level is within this region this is to stop dosing when the probe is out of water or when the pH level is getting too high/low.
Mode	Current mode of the pH dosing system as defined by the program, this can be *Lower* or *Raise*.
Current Hold Off	If pH hold off is enabled on the system, the required level the nutrient must be in order for the pH dosing to be allowed.
Num. Of Doses	Number of doses performed by the module since the last end of day on the system.

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Field	Description
Dose Volume	Total volume the doses used today, this is based on the Dose Rate setting for the module.
Dose Time	Total time the pump has been active today, this is based on the Dose Time.
Outputs	
Type	What part this output has been configured to dose.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Dose Circulation Pump

Dose Circulation Pump

Demand	Output State	Switch Pos.	Fuse
No	Off	Auto	OK

If a circulation pump has been installed on the system this box will become visible.

Field	Description
Demand	Is there a current demand from the nutrient of pH dosing modules for the circulation pump to be active.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Recipe

Recipe

	Num. Parts	Output State	Switch Pos.	Fuse
Day Mix	2	On	Auto	OK
A & B	2	*Not Install*		
A & C	3	*Not Install*		

This box shows a brief overview of the recipes installed on the system and the number of parts they use, these are configure under the settings section for the system. If a recipe selection output has been configured the state of this output will also be shown here.

Field	Description
Num. Parts	Number of part s configured on the recipe.
Output State	The current state of the output if installed, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

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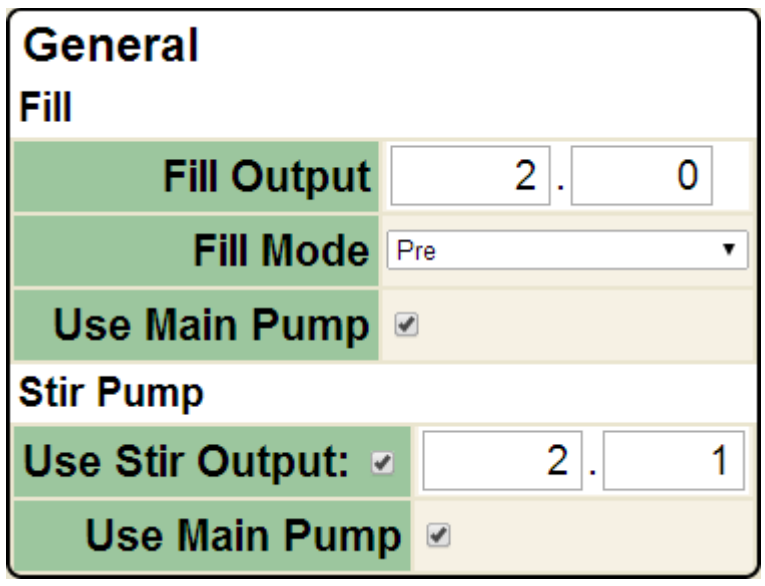
Batch Tank

Configuration

General



Fill Output: Enter the address of the output the fill pump is physically connected to, this output will be driven when the batch system calls for a fill.

Fill Mode: Batch systems have two major fill mode of operations

- ***Pre:*** If a batch system is using a Pre fill mode methodology the tank will only start filling once an irrigation demand has been made. After the irrigation the tank will remain empty until the next demand.
- ***Post:*** In post mode a batch system will begin filling the tank directly after an irrigation has occurred, even if there is no irrigation demand. The tank will be left full.

Use Main Pump: Ticking this box mean that whenever the system is attempting to fill the batching tank the main irrigation pump will also be driven on. This pump is configured under the water system configuration page.

Use Stir Output: Ticking this box will allow the assignment of a specific output which will be used for stirring of the tank.

Use Main Pump: If this box is ticked the main irrigation pump will be driven on whenever there is a stir demand from the batch tank.

Tank Level Sensors

A analog tank level sensor can be used in conduction with a batch tank in order to better control the whole system. This anaglog voltage must be wired into the Moist input pin on an EpM's B connector. If a 4-20mA tank level sensor is being used make sure this signal is being properly wired in to give an accurate result.

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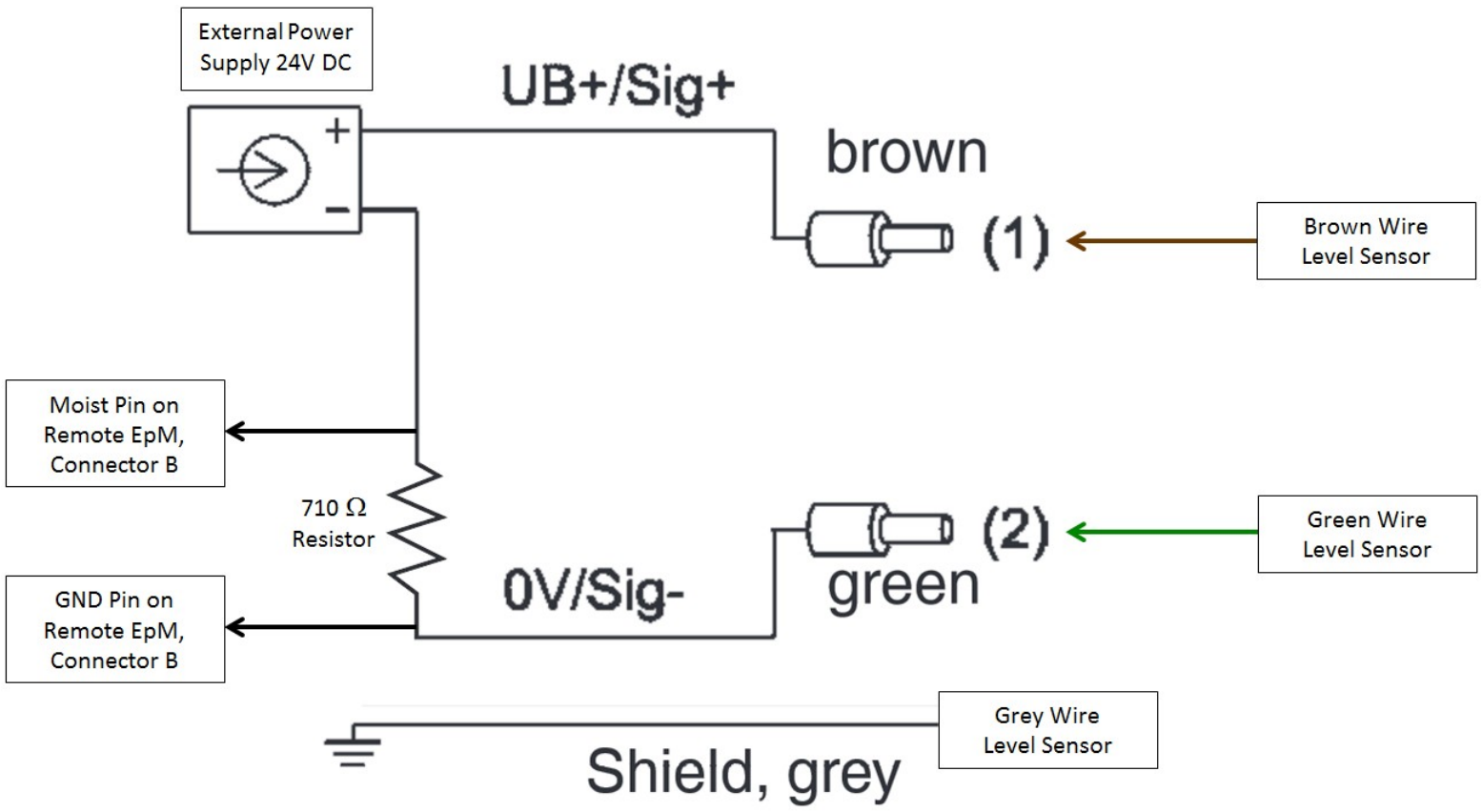
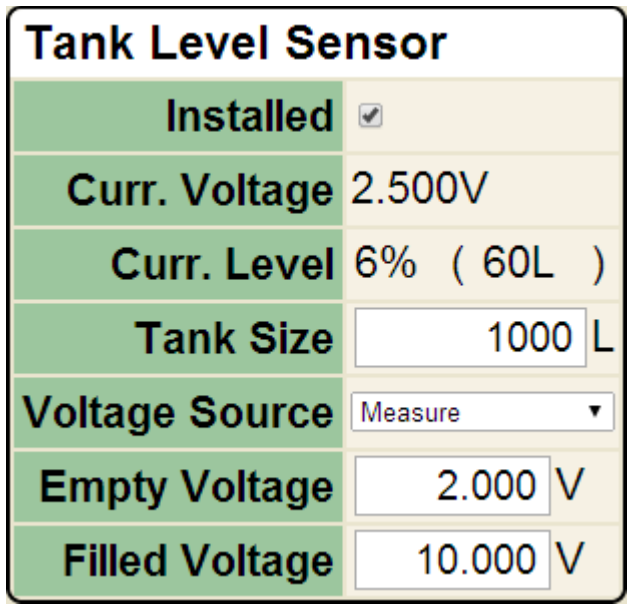


The above diagram is an example of how to wire up a Wika LS10 tank level sensor. All 4 - 20mA signals can be wired into the Moist input of the Remote EpMs this way, by correctly connected the Sig+ and Sig- connections to the device.

Installed: Ticking this box will enable the configuration of a tank level sensor for the batch tank.



Curr. Voltage: Displays the current Analog voltage level being report by the specified voltage source.

Curr. Level: Based on the settings of tank, Empty Voltage, Full Voltage and Tank Size the current level of the tank in percentage and litres will be calculated and displayed here.

Tank Size: Size of the tank being used for batching, this is not crucial to the control of the tank as the voltage readings determine the actual tank level. This is more for user feed back of the tanks exact level.

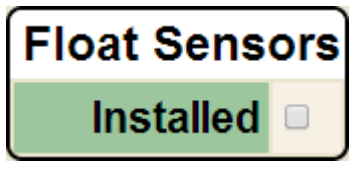
Voltage Source: The Remote EpM group the tank level sensor is being reported to.

- ***Measure:*** The tank level sensor is connect to a Remote EpM under the Measure Group.
- ***Check:*** The tank level sensor is connect to a Remote EpM under the Check Group.
- ***Source:*** The tank level sensor is connect to a Remote EpM under the Source Group.

Empty Voltage: When the tank is empty enter the value being displayed under Curr. Voltage into this field.

Filled Voltage: When the tank is full enter the value being displayed under Curr. Voltage into this field.

Float Sensors



A batch tank can also use float sensors to determine where the tank is full or empty. These sensors are simple contact closure float switches wired into a

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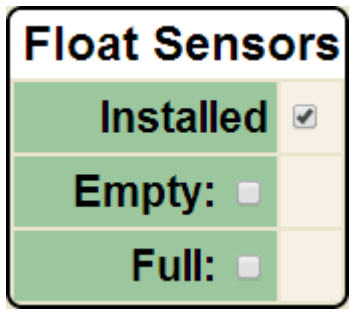
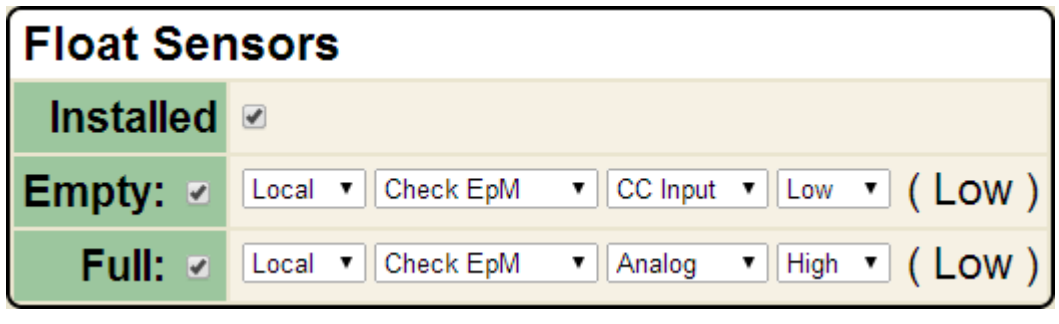
Remote EpM. Since they are contact closure inputs they can be wired either into the Moist pin or the CC pin on a Remote EpM's connector B.

Installed: Ticking this box will enable the configuration of float sensors for the batch tank.





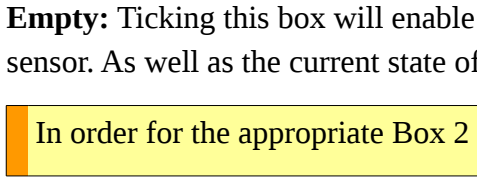
Empty: Ticking this box will enable the configuration of an Empty float sensors. This will also bring up the option of assigning an input to the empty sensor. As well as the current state of the input.

> In order for the appropriate Box 2 settings to be displayed a change to Box 1 (None,Local,Main) must be saved first.

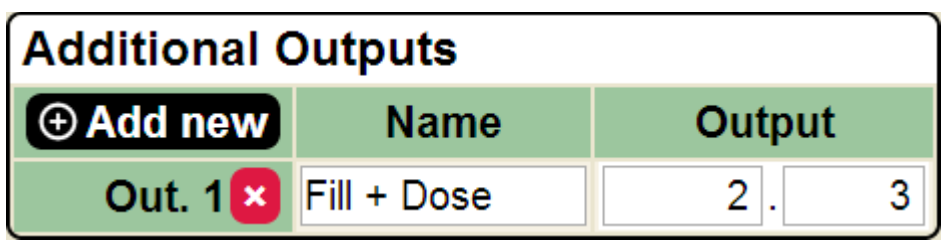
- *Box 1*
  - ***None:*** No input has been selected for this sensor
  - ***Local:*** The input for this sensor is from a Remote EpM local to this irrigation system.
  - ***Main:*** The input for this sensor is from a Main Remote EpM sensor that is share between irrigation systems.
- *Box 2*
  - ***Measure, Check, Source:*** Define whether the input for this sensor is from the local Measure,Check or Source EpM group.
  - ***Main Sensor 1, 2, 3:*** Defines whether the input for this sensor is from main irrigation sensor 1,2 or 3
- *Box 3*
  - **CC Input:** The empty float sensor is wired into the CC input pin on this particular Remote EpM.
  - **Analog:** The empty float sensor is wired into the Moist input pin on this particular Remote EpM.
- *Box 4*
  - **Low:** A low or ground voltage reading on this pin indicates that the Empty sensor has been tripped.
  - **High:** A high voltage reading on this pin indicates that the Empty sensor has been tripped.

Full: The full sensor is configured the same way as the empty sensor described above.

Additional Outputs



A batch tank system has the option of adding general purpose additional outputs that can be driven on when certain staging of the batching cycle are active.



Name: A name can be given to each additional output, this dose not effect control but should be something useful in order to help identify the output.

Output: Address of output that will become active when specified stages are entered.

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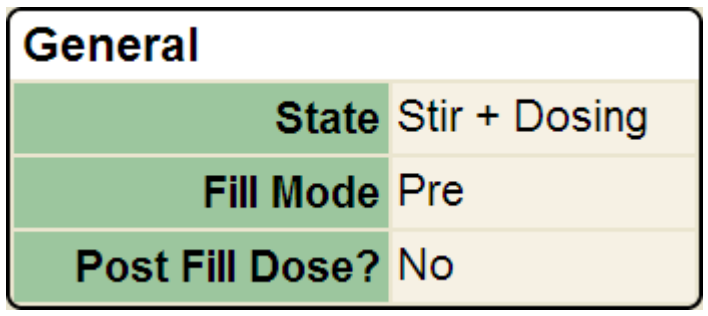
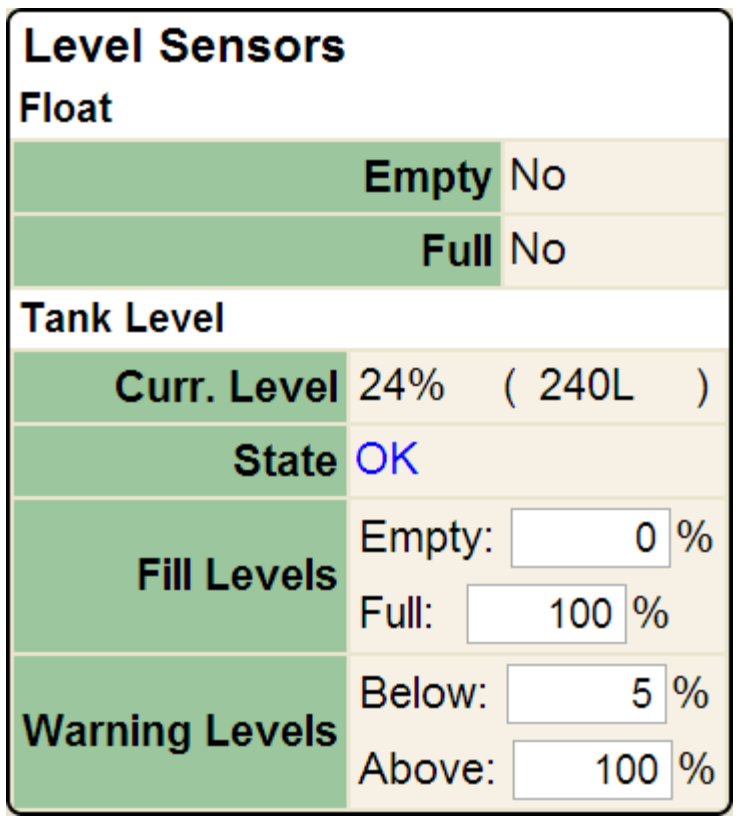
Settings

General



Field	Description
State	Current state of the batch tank
Fill Mode	The fill mode the tank has been set up to use, either *Pre* or *Post*.
Post Fill Dose	Is post fill dosing enabled on this system, this setting is found under the grounds section. If it is enabled the system can dose a post filled tank. Note all groups will use the same program if this option is enabled.

Level Sensors



If either float sensors or a tank level sensor have been installed in the system this settings box will be displayed.

Field	Description
Empty	Is the installed empty sensor registering the tank is empty. If this appears as *No Sensor* check the configuration and installation of the float sensor.
Full	Is the installed full sensor registering the tank is full. If this appears as *No Sensor* check the configuration and installation of the float sensor.
Curr. Level	Current calculated level of the tank based on the voltage from the selected sensors and configuration. This is calculated as both a percentage full as well as a Litre value.
State	Current state of the tanks input, If this appears as *No Sensor* check the configuration and installation of the sensor.
Fill Levels	The levels at which the tank will supply a empty and full signal to the batch control software.
Warning Levels	Levels at which a warning alert will be generated if the tank every reaches or goes outside of.

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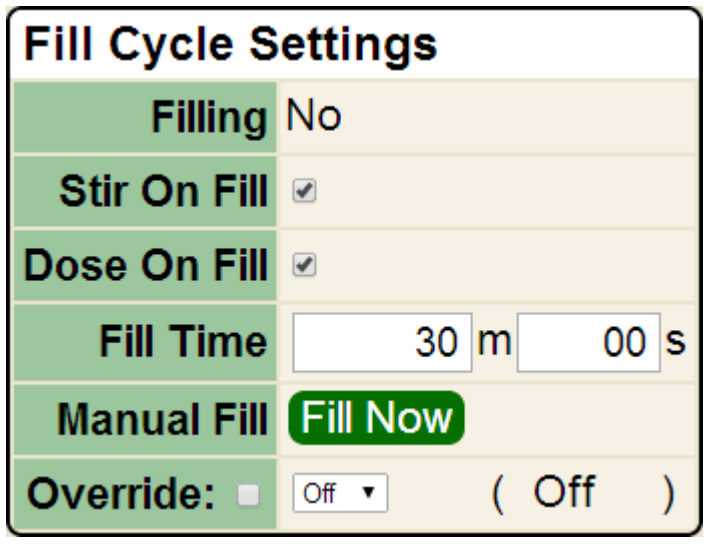
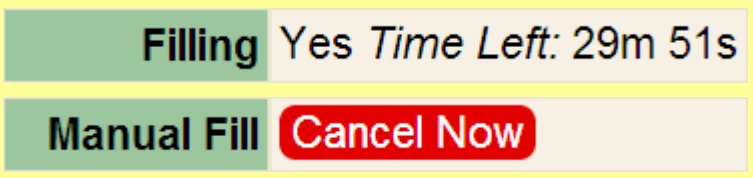
Fill Cycle

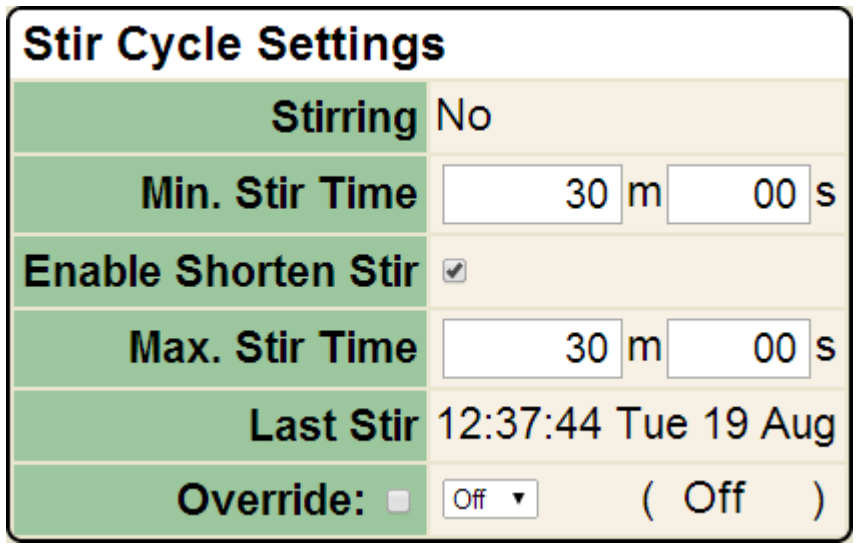


Field	Description
Filling	Is the tank currently fill. If the tank is filling the time remaining will be displayed. Also the manual fill button will also changed to a Cancel Now button.
Stir On Fill	The tank will perform a stir cycle at the same time it is filling.
Dose on Fill	The system will start dosing while it is filling the tank, this is only possible on a Pre fill batching system.
Fill Time	The time needed in order to fill the tank from completely empty to completely full. If the system does not have fill sensors or they have failed a fill will be conducted based purely on this time, so if must be set correctly.
Manual Fill	Pressing the Fill Now button will cause the system to start filling the tank immediately. If a fill cycle is active this button will be replaced with a Cancel Now button.
Override	If a fill output has been installed on the system it is possible to override this to a desired level, ticking this box will drive the output to the state specified in the drop down box, the current state of the output is also displayed here inside the brackets.

If the system is filling the Filling readings box will change to contain the time remaining for the fill cycle. Also the Manual Fill box will display a Cancel Now button.



Stir Cycle



Field	Description
Stirring	Is the tank currently being stirred. If the tank is being stirred the time remaining will be displayed. Also a Stop Stir box will appear along with a Stop Now button.
Min. Stir Time	This is the minimum amount of time the tank must be stirred for before the the cycle can be stop. A stir cycle can be manually stop

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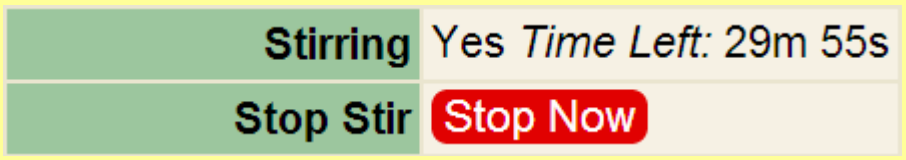
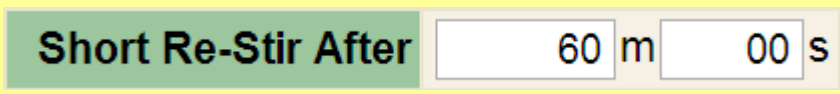
Field	Description
	regardless of time.
Enable Shorten Stir	Ticking this box means that once a stir cycle has passed the Minimum time it can be shortened based on dosing feedback from the tank. An additional shorten stir settings box will become available once this has been saved.
Max. Stir Time	The longest amount of time the tank will be stirred for.
Last Stir	The last time a stir was performed on the tank.
Override	If a stir output has been installed on the system it is possible to override this to a desired level, ticking this box will drive the output to the state specified in the drop down box. The current state of the output is also displayed here inside the brackets.

If the tank is being stirred the time remaining will be displayed. Also a Stop Stir box will appear along with a Stop Now button.

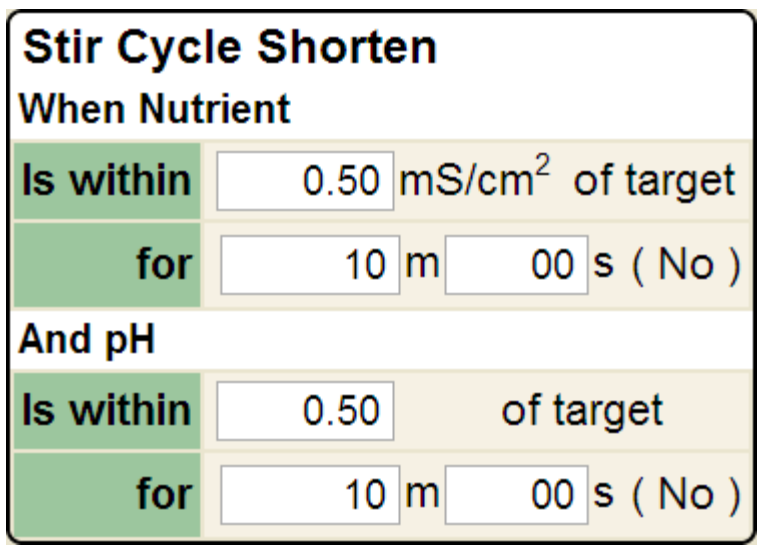


If the tank is left in a waiting full state a Manual Stir box will become available pressing the Stir Now button will cause an immediate stir cycle to be entered.

If a batch tank system has been set up for Post Dose it is possible for the system to sit with a fully dosed tank for a period of time, if the system is set up this way a Re-Stir After settings box will be displayed here a time can be set where a post filled tank will be re-stirred when an irrigation has been triggered after the last stir time plus the Re-Stir time. The triggered stir cycle will obey the Min. Stir time setting in order to gauge when the cycle has finished.



Stir Cycle Shorten



When a system is stirring the dosing should be active it is possible the time set for stirring is longer than the time needed for the tank to reached it's desired nutrient and pH levels. By using the shorten stir functionally it is possible to cut a stir cycle short when the desired level have been reached. The shorten stir time must obey by this function so the tank will be stirred at least for the minimum time. Once this has passed though it is possible for the current levels of the tank to cut the cycle short before the maximum time has been reached.

Both the nutrient and pH levels must be within range in order to shorten the cycle, from the above settings the tank must be within 0.50 mS/cm&sub2 of the nutrient target for at least 10 minutes as well as the pH being within 0.50 of the pH target for at least 10 minute in order for the stir cycle to be shorten.

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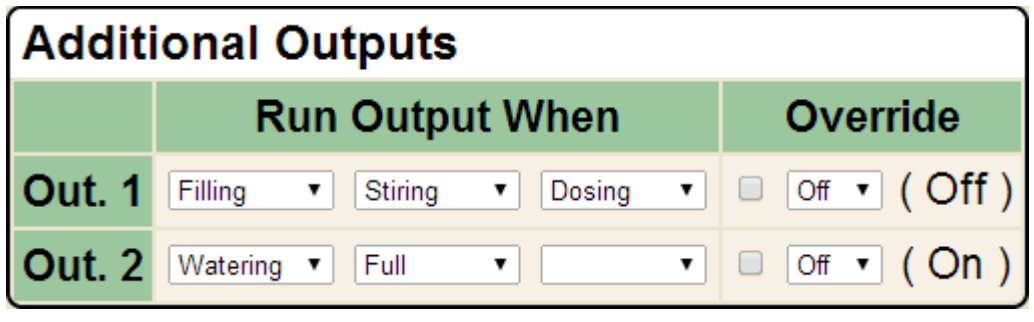
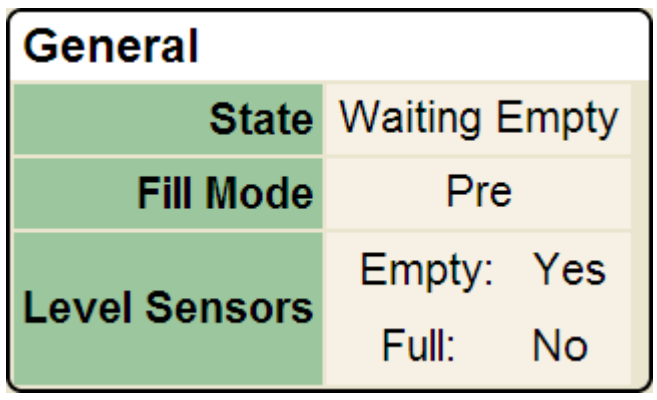
Additional Outputs



The additional outputs are used to drive specified outputs when the batch system is in certain states, these can be useful if specialized batching system configurations are used. An output can have up to 3 different states as a trigger for turning on and will be off when the tank is in none of these states. It is also possible to override these outputs to a desired level, ticking this box will drive the output to the state specified in the drop down box. The current state of the output is also displayed here inside the brackets.

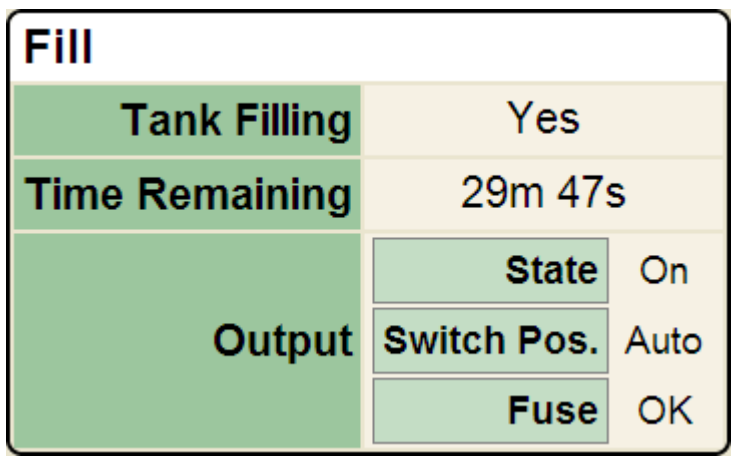
Readings

General



Field	Description
State	Current state of the batch tank
Fill Mode	The fill mode the tank has been set up to use, either *Pre* or *Post*.
Level Sensors	If level sensors have been installed on the system the states of these will be disabled here. If this appears as *No Sensor* check the configuration and installation of the float sensor.

Fill



Field	Description
Filling	Is the tank currently fill. If the tank is filling the time remaining box will be displayed.
Time Remaining	This reading will only the displayed if the system is currently filling the tank.
Output	If a fill output has been installed the outputs information will become visible here. **Output State** The current state of the output for this injector, *On* or *Off*. **Switch Pos** The switch position of this injectors output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

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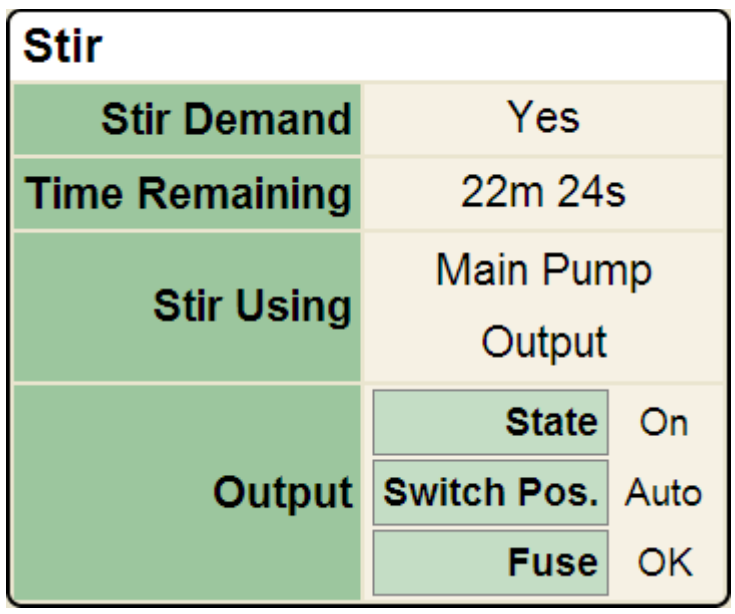
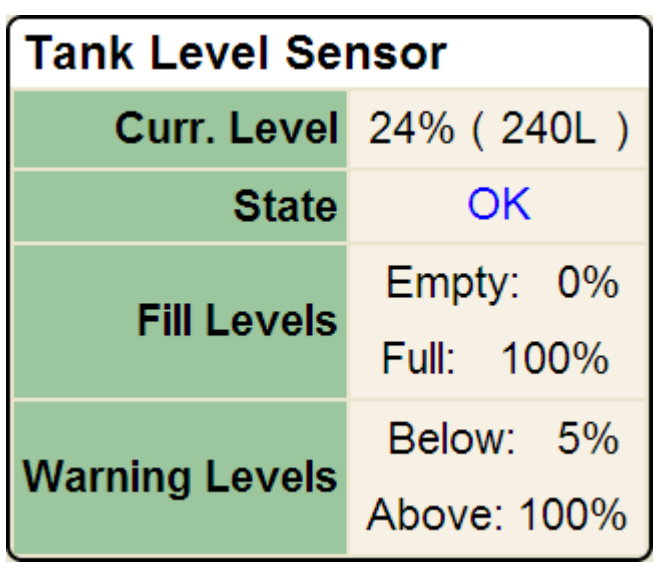
Stir



Field	Description
Stir Demand	Is there currently a demand for stirring on the system. If there is a demand the system will be stirring and a time remaining box will be displayed.
Time Remaining	This reading will only the displayed if the system is currently stirring the tank.
Stir Using	Here the outputs that will be active during a stir cycle will be listed, this is based on the configuration of the stir cycle. Note that if a stir output is installed it will always be driven during a stir cycle.
Output	If a stir output has been installed the outputs information will become visible here. **Output State** The current state of the output for this injector, *On* or *Off*. **Switch Pos** The switch position of this injectors output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

Tank Level Sensor



If a tank level sensor has been installed in the system this settings box will be displayed.

Field	Description
Curr. Level	Current calculated level of the tank based on the voltage from the selected sensors and configuration. This is calculated as both a percentage full as well as a Litre value.
State	Current state of the tanks input, If this appears as *No Sensor* check the configuration and installation of the sensor.
Fill Levels	The levels at which the tank will supply a empty and full signal to the batch control software.
Warning Levels	Levels at which a warning alert will be generated if the tank every reaches or goes outside of.

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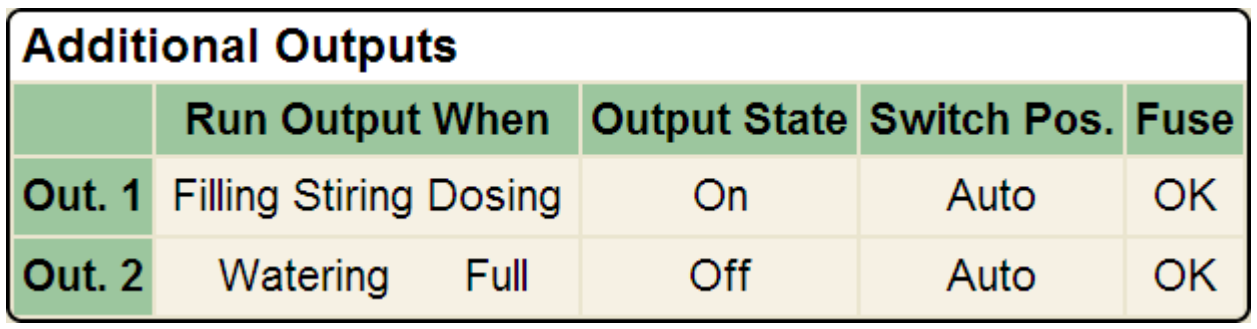
Additional Outputs



Additional Outputs

	Run Output When	Output State	Switch Pos.	Fuse
Out. 1	Filling Stiring Dosing	On	Auto	OK
Out. 2	Watering Full	Off	Auto	OK

If additional outputs have been configured on the system this box will be displayed

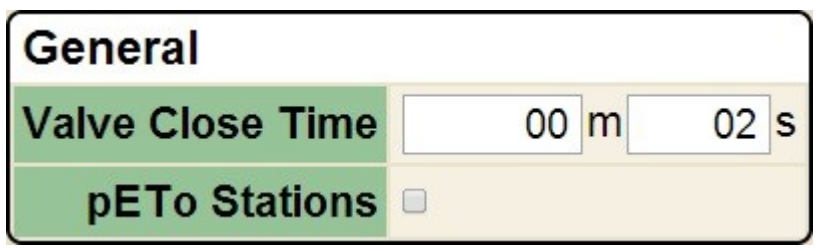
Field	Description
Run Output When	The list of batch states the output will be driven on during.
Output State	The current state of the output for the stir pump, *On* or *Off*
Switch Pos	The switch position of pump output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Stations

A Station or zone is used to logically separate watering valves within a system. One Multi controller can support up to 300 different Stations or Zones.

Configuration

General



General

Valve Close Time 00 m 02 s

pETo Stations

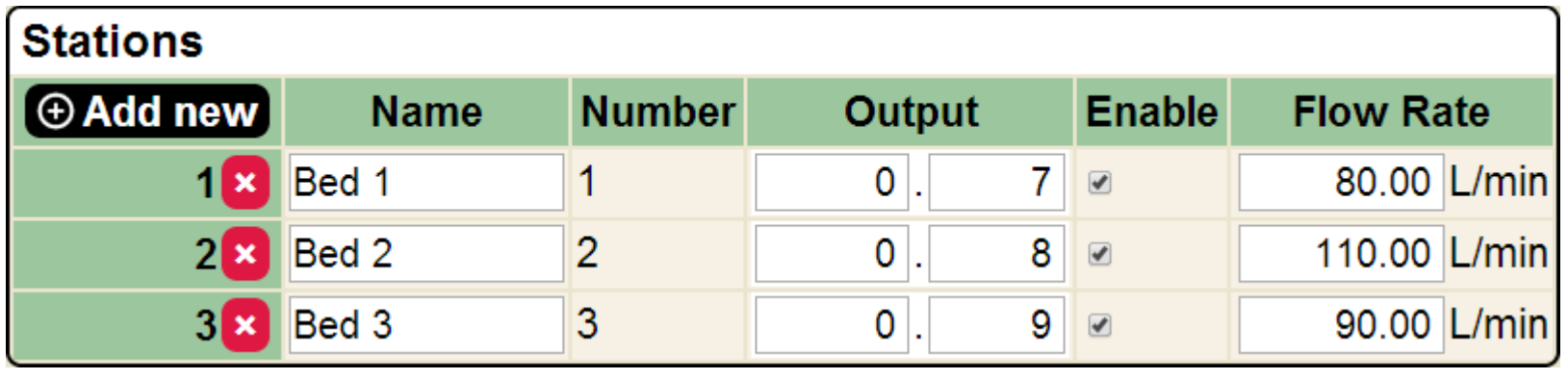
Valve Close Time: Most valves require a certain amount of pressure in order to close correctly. This means the pump must be running but the station output itself must be off. This is the time need in order to this to happen.

pETo: pETo is an advanced controlling methodology based around the Evapotranspiration model of plants. This is a very complex control method that should only be used if a full understanding of those this model works. This option is only available on In line and Batched systems.

Stations

Stations

⊕ Add new



Stations

⊕ Add new	Name	Number	Output	Enable	Flow Rate
1 ×	Bed 1	1	0 . 7	☑	80.00 L/min
2 ×	Bed 2	2	0 . 8	☑	110.00 L/min
3 ×	Bed 3	3	0 . 9	☑	90.00 L/min

Name: This is a unique name given to a specific station within the system. The name itself has no effect on control but is useful for identification elsewhere in the system. It is also used for alerting.

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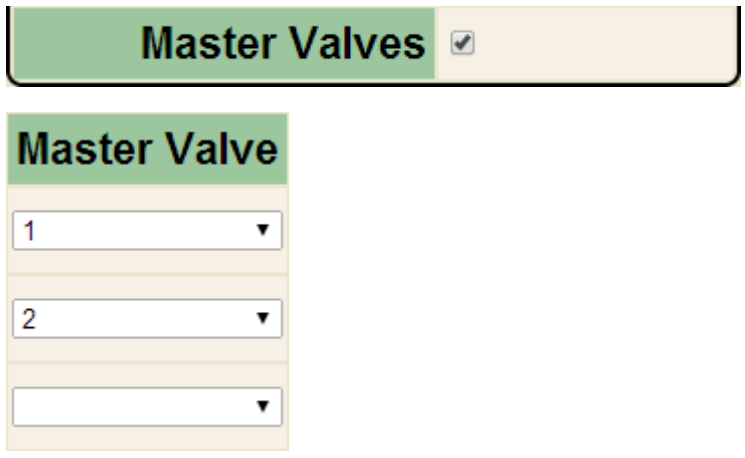
Number: This is an index generated by the system for the corresponding stations it will be used for identification if the name is left blank.

Output: This is the physical output this station is wired. Please refer to section 3.0 Outputs for information about this field.

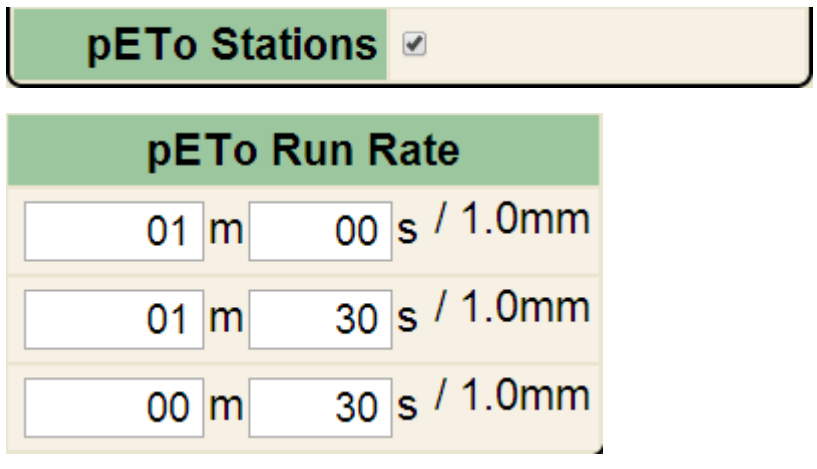
Enable: A global enable for the station, if a station to be used in watering this must be ticked. Un-ticking it will make this station unable to be watered by the system. This can be useful if this station has becoming faulty it can be disabled globally in one place.

Flow Rate: In order for the system to acknowledge there is a problem with a station, the flow throughput of the station must be known to the system. Once this station becomes active the system will expect the flow rate to be at a certain level based on this setting. Seeing too big of a variation in this reading the system can determine if a problem has occurred.

Master Valve: If master valve are configured on the system, stations can be assigned to use them. Match the number in this drop down box to a Line Number of a particular master valve, in order to turn this valve on when this station becomes active. If this is left blank no master valves will be switched on when this station is running.



pETo Run Rate: If the pETo Stations has been ticked this option will be available. A pETo run rate can be specified for each station the use of this run rate is specified later under the groups setting page.



Readings

Stations

	Enabled	Act. Count	Accum. Vol.	Output State	Switch Pos.	Fuse
Bed 1	Yes	1	32L	Off	Auto	OK
Bed 2	Yes	1	46L	Off	Auto	OK
Bed 3	Yes	1	36L	Off	Auto	OK
Bed 4	Yes	1	28L	On	Auto	OK

Enabled: This reading relates to whether a stations is enabled or not on the system, this is set using the enabled configuration option for the station. If the station is not enabled here it will not be able to be watered by any group.

Act. Count: Current times the stations has been active today, this includes manual operations. Note when counting manual operations the time the satiation is on is not taking into account simply that it has become active. Even if this is only switched on the off for a small interval this count will increase.

Volume: If a flow meter has been installed in the system an this column will visible this holds the current volume for a station. If the station is not active this will be the volume passed through the station during the last irrigation. When a new irrigation starts on this station this value is reset and starts accumulating again.

Accum. Vol.: Current volume the station has passed today, this is reset at the systems end of day.

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Outputs State: Current state of the output.

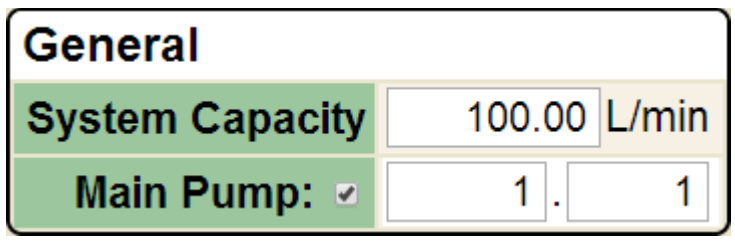
Switch Pos.: Current switch position of the assigned output.

Fuse: Current state of the fuse for the assigned output.

Water System

Configuration

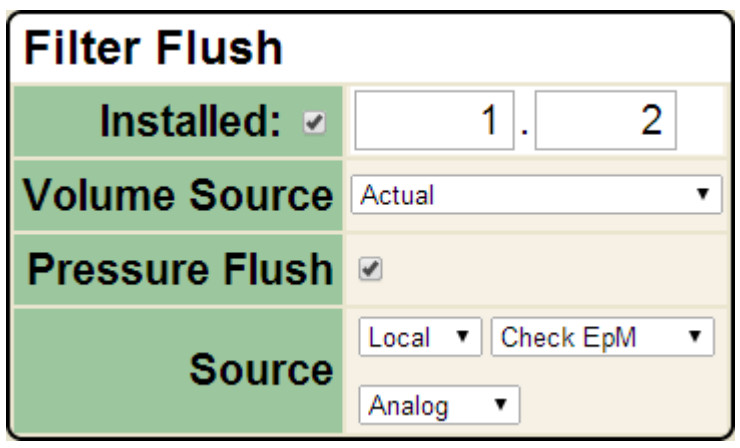
General



System Capacity: This setting is important for irrigation systems. It specifies the water throughput capability of the system, this is used to determine if multiple stations or multiple groups can run. It can also be used in certain aspects of dosing.

Main Pump: Ticking the main pump box will display the output assignment box for the pump. A main pump is the pump used for irrigation of the zones, in some cases this can also be used to stir the batch tank.

Filter Flush



Installed: If the irrigation system has a filter installed it is usually recommended to flush this periodically. Ticking this box will enable an output to be assigned to the filter flush. When flushing this output will becoming active.

Volume Source: It is possible to select the filter flush on volume to look at either the actual or calculate volumes used on the system.

- ***Calculated:*** The filter flush will use the calculated volume reading in order to trigger a filter flush. Note that the calculated volume is derived from the flow rate set under each station with in a system, these values must be correctly enter for accurate results.
- ***Actual:*** The filter flush will use the actual volume reading to trigger. Note that this value is derived using the actual flow supplied by the Measured EpM sensors. A flow meter must be properly configured on the system in order to use this volume correctly.

Pressure Flush: A filter flush can be triggerd from a pressure sensor. A pressure sensor is used to detect when the filter has become to blocked and needs to be flushed.

Source: The input where the pressure sensor is physically wired in to. This can be Main or Local EpM sensors CC or Analog (Moist) input.

Flow Triggered Output

A flow triggered output is a general purpose output that can be configured to turn on when flow is detected from any number of sensor sources. Flow levels can be adjusted to make sure the output will only turn on when a certain amount of flow has been detected.

Installed: Ticking this box will install a flow triggered output onto the irrigation system. Once ticked the output configuration options will be displayed.

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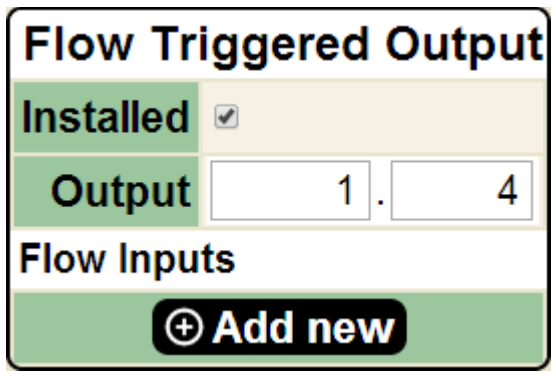
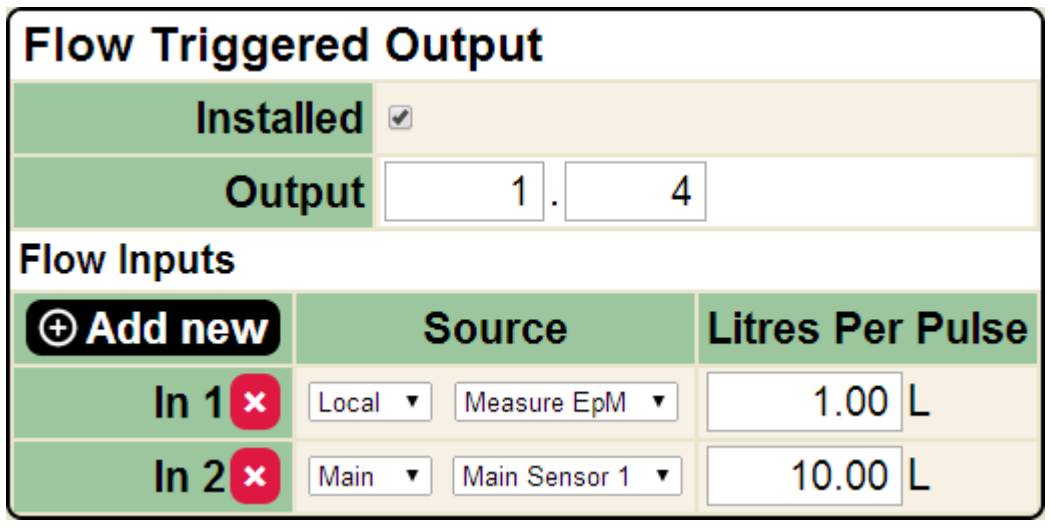


Output: Address of output that will be driven on when flow is detected.

Flow Inputs

Any number of flow inputs can be added to the system. Once added each one needs to be configured.

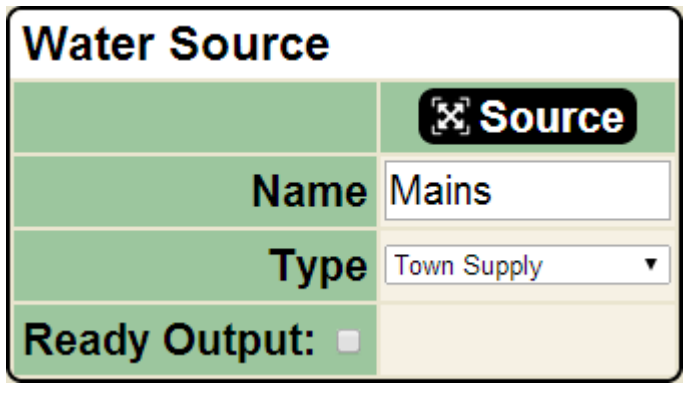


Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
    - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
    - ***Check:*** Flow source is the Check Remote EpM sensor group.
    - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
    - ***Main Sensor 1:*** Flow source is from Main Sensor 1.
    - ***Main Sensor 2:*** Flow source is from Main Sensor 2.
    - ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: Here the flow rate of the desired source is specified, this value should be specified by the manufacturer of the flow meter.

Water Source



Name: This is a unique name given to the water source useful for identification elsewhere in the system. It is also used for alerting.

Type: Type of water source being used on the system. This can vary depending on individual requirements of the system.

- ***Mains:*** Irrigation system is connected directly to a main water supply.
- ***Tank:*** The irrigation system is feed from a tank. Note this is not the same as a batch tank. If the batch tanks fill input is on the output of another tank then this option should be selected.
- ***Blend Tank:*** This is the same as a normal tank except with the added ability for blending two different fill inputs in order to try and pre-blend the nutrient level of the tank.
- ***Main Tank 1, 2 & 3:*** Main Tanks are identical to normal system tanks but are configured at the site level. This is useful if one tank is to be used across multiple irrigation systems. These are configured outside of an irrigation system, since they are used across multiple systems.

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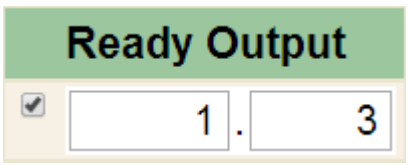
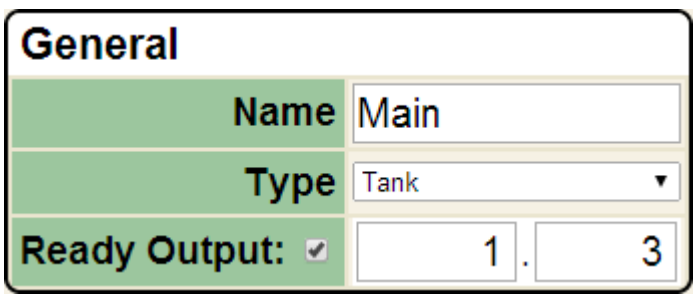
Ready Output: A water source such as a tank may only be ready when it is a certain percentage full, if a ready output is installed this will turn on once the water system has determined it is ready. Note a Town Water source is always ready.



Additional Configuration

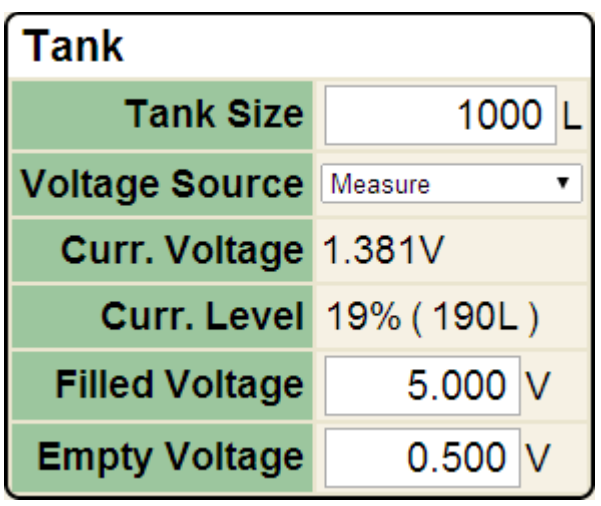
Pressing the source button at the top of the box will display additional configuration's for the water source depending on which type of source has been selected.

General



The general box displays the same settings as the overview box for the water source. See above for more information of these settings.

Tank



IF the water source is a Tank or a blending tank this box will be displayed here all the information for configuring a tank will be displayed.

Tank Size: Size of the tank being used for batching, this is not crucial to the control of the tank as the voltage readings determine the actual tank level. This is more for user feed back of the tanks exact level.

Voltage Source: The Remote EpM group the tank level sensor is being reported to.

- ***Measure:*** The tank level sensor is connect to a Remote EpM under the Measure Group.
- ***Check:*** The tank level sensor is connect to a Remote EpM under the Check Group.
- ***Source:*** The tank level sensor is connect to a Remote EpM under the Source Group.

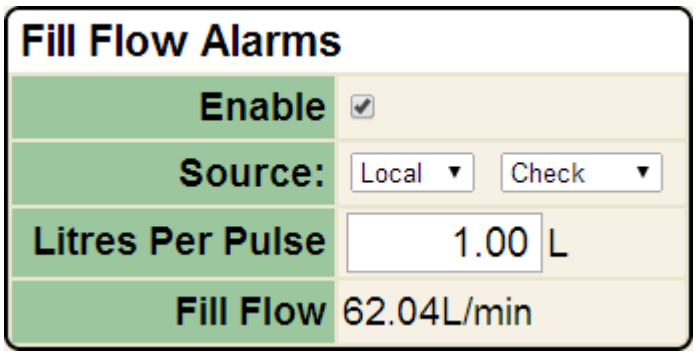
Curr. Voltage: Current voltage on the Moist input of the sensor source selected above.

Curr. Level: Current level calculated from the settings.

Filled Voltage: When the tank is full enter the value being displayed under Curr. Voltage into this field.

Empty Voltage: When the tank is empty enter the value being displayed under Curr. Voltage into this field.

Fill Flow Alarms



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IF the water source is a Tank this box will be displayed.

Enable: This box will enable the fill flow alarm on the system. Once ticked and saved additional options will become available.

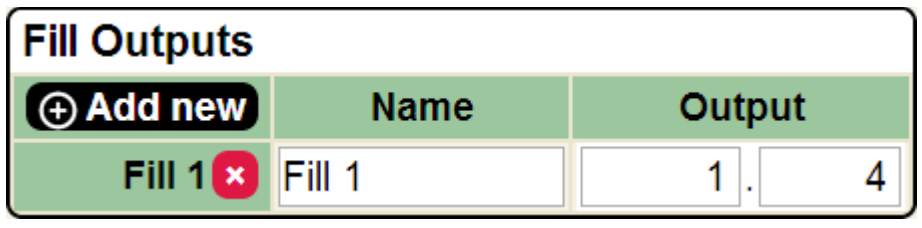
Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
    - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
    - ***Check:*** Flow source is the Check Remote EpM sensor group.
    - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
    - ***Main Sensor 1:*** Flow source is from Main Sensor 1.
    - ***Main Sensor 2:*** Flow source is from Main Sensor 2.
    - ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: How many litres is passed through the flow meter before a single pulse is generated, this is specified by the manufacture of the meter.

Fill Flow: Current flow being measured by the configured sensor source.

Fill Outputs

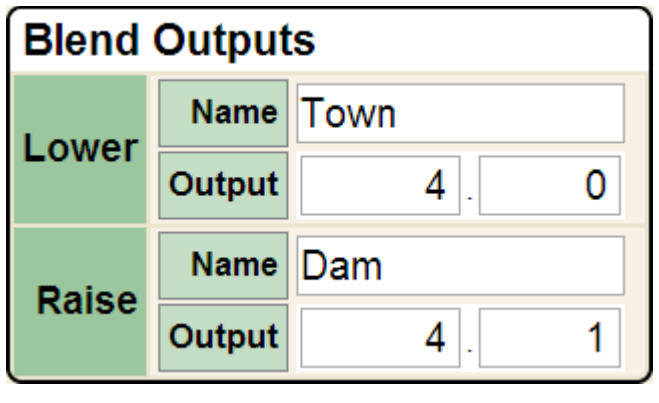


IF the water source is a Tank this box will be displayed. Fill outputs can be added for removed from the tank, a tank can support up to 4 fill outputs.

Name: Name given to the output for identification purposes.

Output: Address of the output the fill valve is physically wired to.

Blend Outputs



IF the water source is configured as a blending tank this box will be displayed.

Lower

The lower output is used to supply water that will effectively lower the nutrient level of the tank, this is usually connected to town water.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

Raise

The raise output is used to supply water that will effectively raise the nutrient level of the tank, this is can be connected to a pre-dosed water supply or a Dam the collects run off.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

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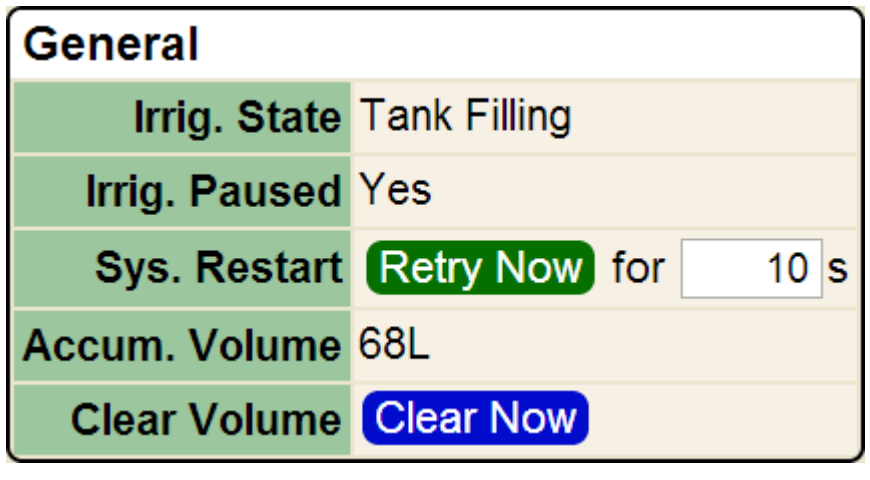
Settings

General

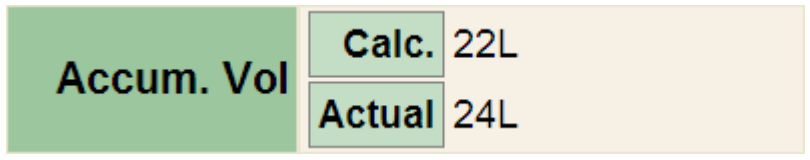


Irrig. State: Current state of the irrigation system. This can be driven from multiple installed functions

Irrig. Paused: Is the irrigation system currently in a paused state.

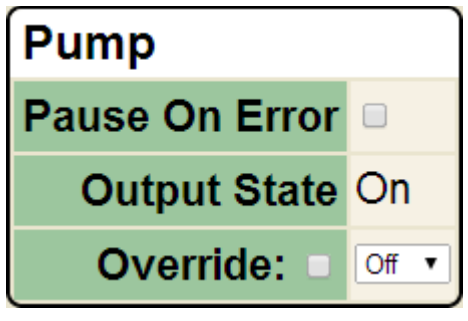
Sys. Restart: If the system is currently paused this box will be displayed, if the irrigation system is in a state in which it might need to be resumed to try and clear this. If a flow error or pump error has occurred the system needs to start running again in order to check if the error conditions have been resolved. Pressing the retry now button will unpause the system and hold it unpaused for the time specified in the box. After this time if an error conditions still exist on the system it will return to the paused state.

Accum. Volume: Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.



Clear Volume: This will immediatelty set the Accumulated volume reading back to zero. This will happen to both the calculated and actual volumes on the system.

Pump



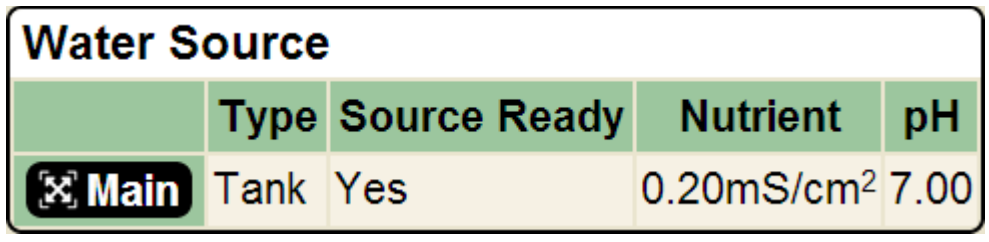
This box will be displayed only if a Main pump has been installed on the configuration page.

Pause On Error: If communications to the output module that controls the pump or the pump switch has been set to manual on this module, an error will be generated by the system. Ticking this box means that when an error like this occurs the system will be paused and stop all irrigation.

Output State: Current state of the pump output.

Override: Ticking this box will override the output to the state specified in the drop down box.

Water Source



Depending on the type of water source configured on the system the additional options displayed on the expanded menu will differ. The common readings are displayed here, pressing the expand button will bring up extra settings boxes.

Type: Current type of water source configured.

Ready: Is the water source ready. Note Town Water sources are always ready.

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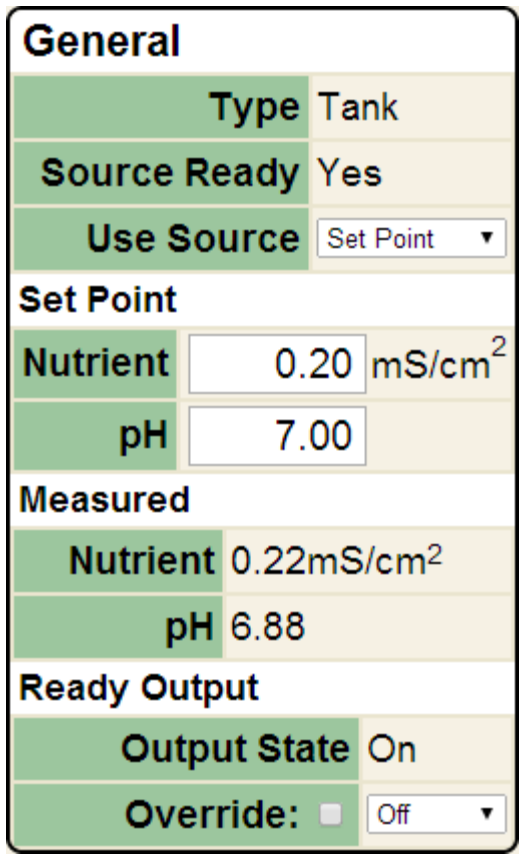
Nutrient: Current nutrient level of the water source.

pH: Current pH level of the water source.

General



The general tab the same for all types of water sources, it is the only options box available for a Town Water and Main Tank source.

Type: Type of water source.

Source Ready: Is the water source currently ready this can be set from a number of places depending on the type configured. For a Tank and Blending tank the locate ready when above is responsible for that, also the failsafe setting. When using main tanks the same settings will drive this value but are based on the main tank ones. A town water source is always ready.

Use Source: Certain dosing alogrithms in the system required a starting point in order to operate correctly. This starting point is the water nutrinet and pH levels. These can be be either from a set point or measured using a Source EpM sensor group.

Set Points

Here both a nutrient and pH source set point can be configured.

Measured

The current nutrient and pH levels being measured from the Source EpM group are displayed here.

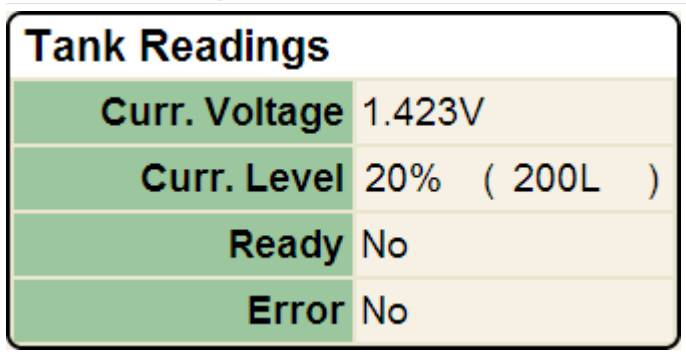
Ready Output

The ready output sub box will only be displayed if a ready output has been configured on the water source.

Output State: Current output state of the ready output.

Override: Ticking this box will override the ready output to the state specified in the drop down box.

Tank Readings



If a water source is configured as a tank or blending tank this reading box will be displayed, it contains the major readings relating to the tank.

Curr. Voltage: Voltage being reported on the Moist input of the sensor selected to be the source for this tank.

Curr. Level: Based on the size and voltage levels configured for this tank the Curr. Voltage level is converted into a percentage full value as well as a approximate litre value.

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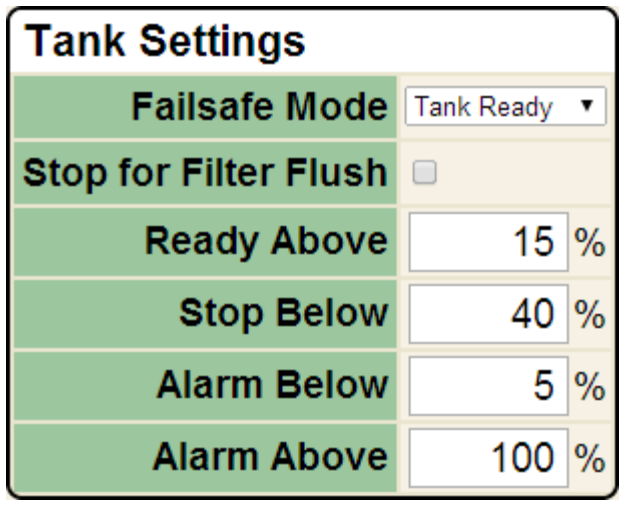
Ready: is the tank ready.

Error: Is the an error on the tank.

Tank Settings



If a water source is configured as a tank or blending tank this settings box will be displayed, it contains the major settings for a tank.

Failsafe Mode: If the voltage reading is ever lost the system has no idea what level the tank is at, if a water source is not ready the system will not be above to irrigate. Setting this to Ready means that if the voltage level from the sensor is ever lost the tank will instantly become ready, meaning that irrigation can still happen insuring plants can still be watered. If this is set to Delay the system will become paused as the water source will no longer be ready for irrigation's.

Stop for Filter Flush: If a filter flush functionality has been configured on the system it maybe be necessary to stop the tank from filling during this operation. If this box is ticked and a filter flush is started the tank will stop filling operations.

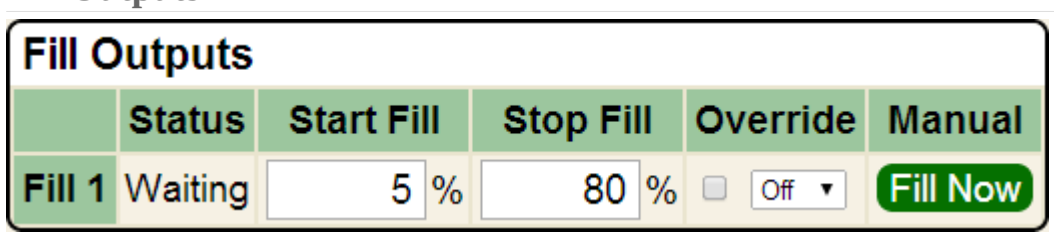
Ready Above: Once the tank has calculated it is at least this full the water source will become ready an irrigation's are allowed.

Stop Below: If the tank ever drops below this level the water source will become unavailable and irrigation's will not be allowed. The different ready and stop levels are used because the tank might usually fill a lot faster than it is irrigated out. This means a tank can be ready sooner and only stop if it drop below a critical level.

Alarm Below: If the tank ever drops below this percentage full an alarm event will be generated by the system.

Alarm Above: If the tank ever goes above this percentage full an alarm event will be generated by the system. If a tank is configured correctly a percentage over 100% should not be possibly if it does the tank configuration might need to be adjusted to insure the reported voltage is converted into a true representation of the fill level.

Fill Outputs



If a water source is configured as a tank type it displayed this setting box.

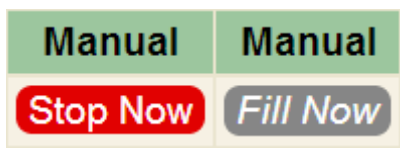
Status: Current status of the fill output.

Start Fill: When the tank level drops below this value the fill output will be turned on.

Stop Fill: Once the tank level is above this value the output will be turned off.

Override: Ticking the box will force the output to the state specified in the drop down box.

Manual: When a fill output is in the waiting state it can be manual triggered for filling by Pressing the fill now button, this will turn on the output until the tank level reaches the stop fill level or the Stop Now button is pressed. If the fill output is currently running the stop now button will be displayed. Pressing this button will cause the fill output to turn off until the tank level drops below the start fill level or the Fill Now button is pressed. If an error has occurred in which it is not possible to manual run the output this button will be disabled.



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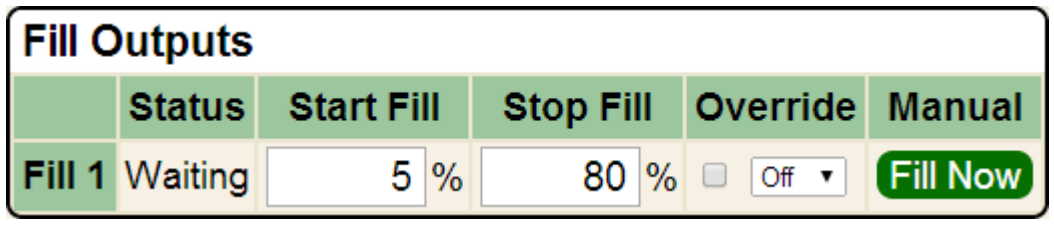
Fill Flow Alarm



If a water source is configured as a tank type it displayed this setting box.

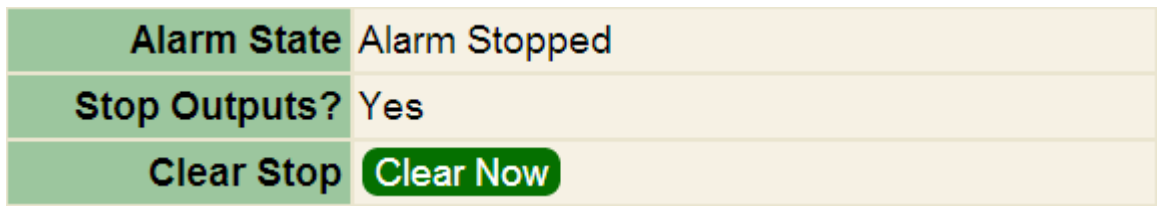
Fill Flow: Current flow rate being measured on the fill flow sensor configured.

Alarm if: If the tank is currently filling e.i. any fill output is currently on and the flow being measured on the meter drops below the set level for the specified amount of time and alarm conditions has occurred.

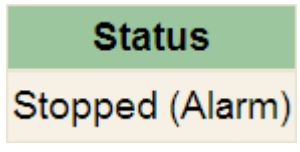
Stop Fill on Alarm: Ticking this box means that if the above alarm conditions are meeting all fill outputs will be stop until this is cleared.

Alarm State: Current state of the alarm.

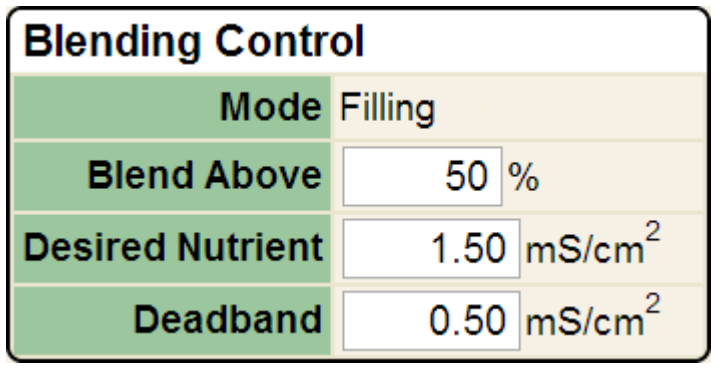
Stop Output: Has the alarm caused the fill outputs to stop. If this is true the fill outputs state will also change to indicated this.



Clear Stop: Pressing the clear now will remove the stop conditions placed on the fill outputs by the alarm. The tank will return to normal operation. This button will only appear if an alarm condition has occurred which stopped the outputs from operating. When the alarm conditions arises the fill outputs status will change to indicated this and the manual buttons will be disabled.



Blending Control



The blending control box will only be displayed if a water source has been configured as a blending tank. The main blending control of the tank is done by the use of a desired nutrient level setting as well as a deadband. The tank also has a blend above setting which is the level the tank must get to before lower and raise outputs can start to be turned off. Below this level the tank is in fill mode where both output will be on in order to fill the tank as fast as possible. Once a tank has reached it blend level it will use the current nutrient level in order to control the outputs. If the current nutrient level drops below the desired level the raise output will be switched on, if the nutrient level reaches a point which is equal to the desired level plus the deadband the raise output will switch off. If the nutrient level is above the desired level the lower output will be switched on, if the level equal the desired level minus the deadband this output will be switched off. This control method means that both output are usually constantly on and will only switch off if extremes are meet. This is because not only are we trying to maintain a desired level of nutrient with in the tank, we are also try to fill it.

Mode: Current mode of the blending tank. If the tank is currently filling both the lower and raise fill output are on this is to give an even mix of both as well as fill the tank as fast as possible. Blending of the two sources only happens when the tank is sufficiently full.

Blend Above: When the tank level has reach a certain level blend of the water sources can occur.

Desired Nutrient: Desired nutrient level of the water source. This is the main setting that controls the lower and raise outputs.

Deadband: The amount the nutrient level must change by before a change in the fill outputs will occur.

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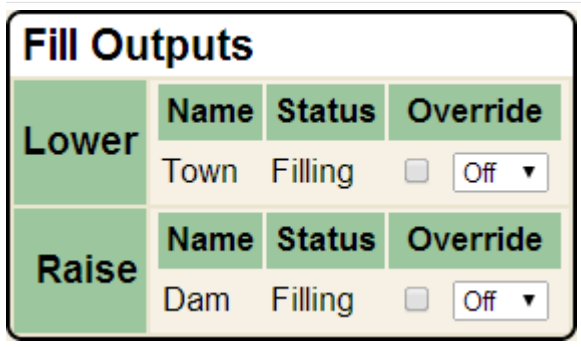
Fill Outputs



The blending control box will only be displayed if a water source has been configured as a blending tank.

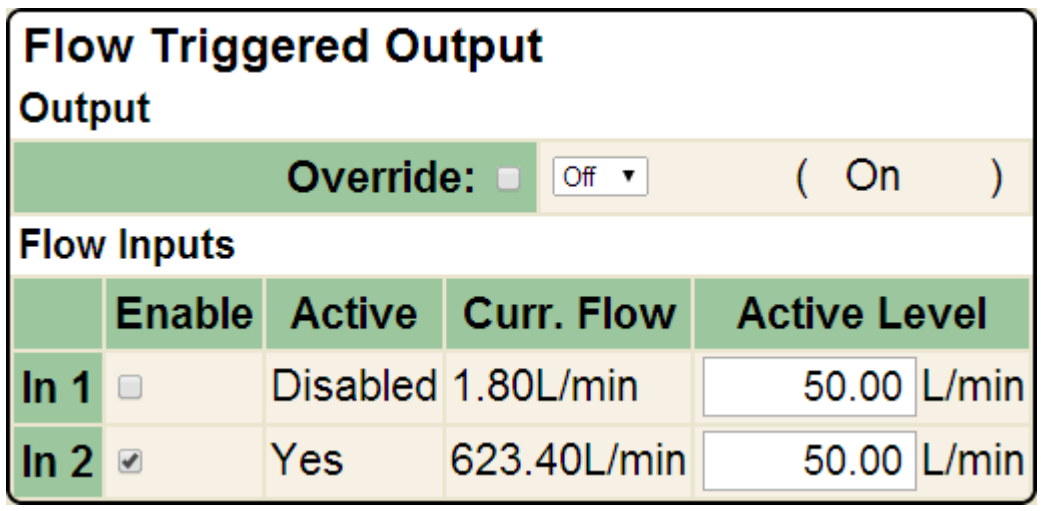
Lower

- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Raise

- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Flow Triggered Output



Override: Ticking this box will override the output to the state specified in the drop down box.

Enable: In order to use a configured flow input as a trigger for this output it must be enabled.

Active: Has the current flow level meet the required level in order to turn on the output.

Curr. Flow Current flow rate being report by the configured input.

Active Level: The level the flow must reach before it is deemed to actually be active and the output to be turned on.

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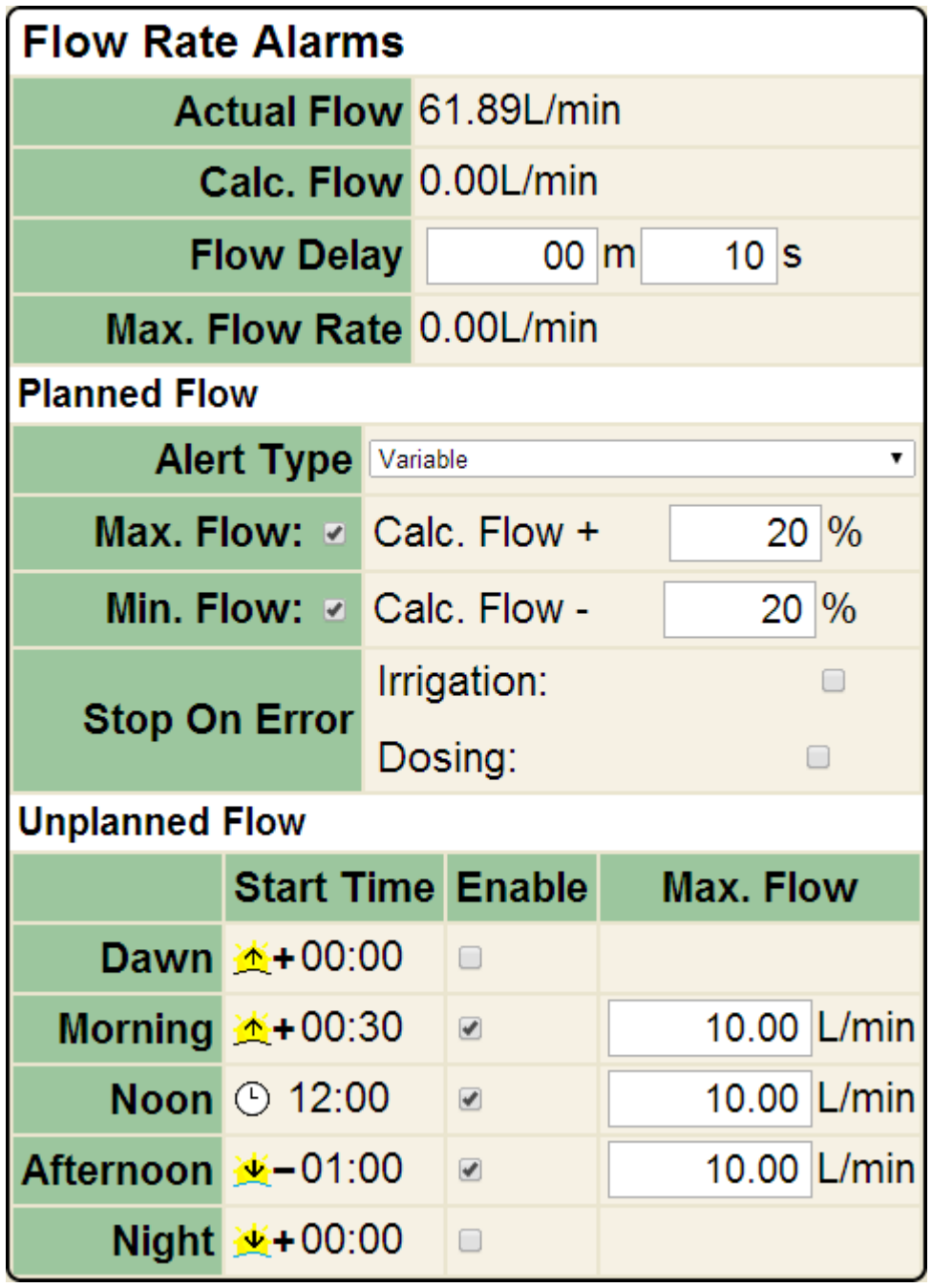
Flow Rate Alarms



This box will on be visible if the system has a mesaure flow meter properly configured. Though there is a separate alarms tab located on the settings page that is used for generic alarm settings rather than specified levels. An irrigation system has two flow rate alarms that become active under different conditions (Planned and Unplanned).

Actual Flow: Current flow rate being measured by the system.

Calc. Flow: The current flow that should be present on the system derived from the station flow rate settings.

Flow Delay:: When a system begins to water it can take a small amount of time for the pump to spool up. This lag can also happen when the flow is changing due to stations size. This setting lags the measurement by this factor to stop incorrect alarms being generated.

Max. Flow Rate: Current maximum flow rate expected on the system given its current state of operation.

Planned

A Planned flow alarm becomes active when we are expecting flow to be present on the system e.i a irrigation has become active. The system can be configured to generate both minimum and maximum flow rate alarms based on the flow of the system. The flow rate variable configured for each station is compared to the current flow rate being measured if this various by a certain amount an error is said to have occurred and an alarm should be generated. When an event such as this occurs it is possible to stop the Dosing modules on the system if installed and or stop the irrigation completely.

Alert Type: The type of alarm used for planned flow.

- ***Disabled:*** No planned flow alarms will be generated.
- ***Variable:*** The minimum and maximum flow levels vary depending on the calculated flow rate of the system.

  Max. Flow: Ticking this box means that the maximum planned flow rate alarms are enabled on the system. If the actual flow is ever above the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Max level will still be used by this will be set to a range that cannot be reached by a irrigation system.

  Min. Flow: Ticking this box means that the minimum planned flow rate alarms are enabled on the system. If the actual flow is ever below the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Min level will still be used by this will be set to a range that cannot be reached by a irrigation system.

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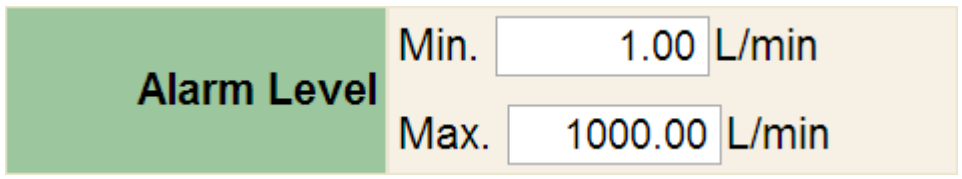
- ***Set Levels:*** The minimum and maximum flow level are fixed and the actual flow rate is compared to these directly.



Min.: Minimum flow rate allowed on the system when irrigating. If the actual flow drops below this for a certain time, generate an alarm.
Max.: Maximum flow rate allowed on the system when irrigating. If the actual flow rate goes above this for a certain time, generate an alarm.

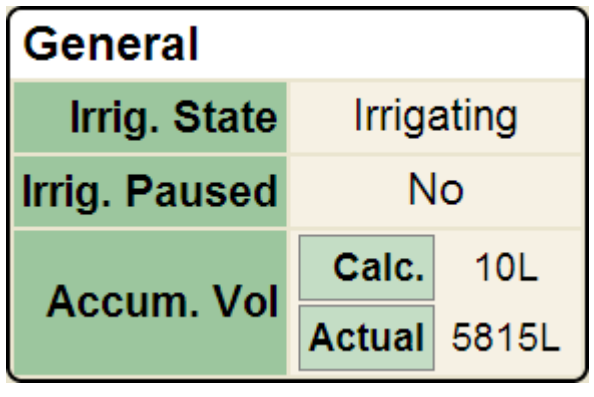
Stop On Error: When an error occurs on the system it is possible to stop either the Dosing Modules or entire irrigation system.

Unplanned Flow

A Unplanned flow alarm becomes active when we are not expecting flow to be present on the system e.i when there is no active irrigation. The system can be configured to enable this alarm per time period. It is also possible to set the level of flow required per time period in order to validate the alarm. If the actual flow rate is above the Max.Flow level for a specific amount of time and it is enabled an alarm will be generated. Note the time period enable needs to be saved in order to see and edit the Max. Flow variable.

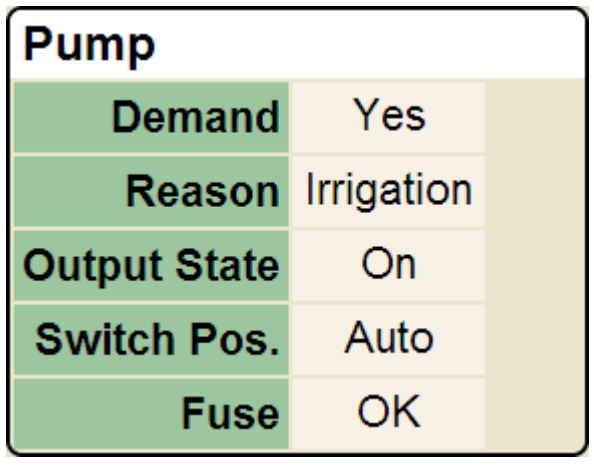
Readings

General



Field	Description
Irrig. State	Current state of the irrigation system. This can be driven from multiple installed functions
Irrig. Paused	Is the irrigation system currently in a paused state.
Accum. Volume	Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.

Pump



Field	Description
Demand	Is there current;y any demand in the system the means the pump should be running.
Reason	This field is only visible when a demand is active there are only a few source that can demand the pump to run, *Irrigation:* an irrigation is active on the system. *Filter:* The run pump on filter flush setting has been selected and the system is currently flushing. *Batch:* The batch system is calling for the pump to be active, this means the run pump while filling or stirring settings have been selected and the batch module is currently performing one of these actions.
Output State	The current state of the output for the pump, *On* or *Off*
Switch Pos	The switch position of the pump output, *Manual* or *Auto*

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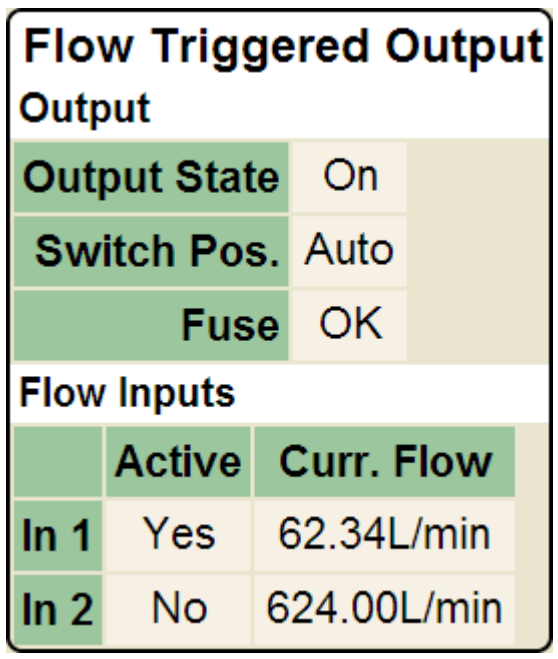
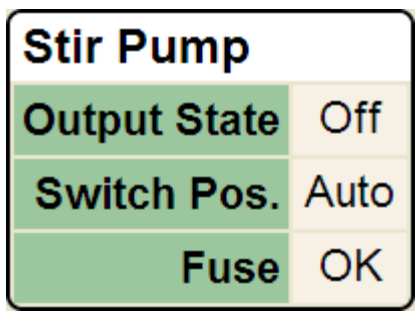
Field	Description
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Flow Triggered Output



Field	Description
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*
Active	Is the configure input sources flow reached the desired level to turn on the output.
Curr. Flow	Current flow being report from the configure sensors for this flow input.

Stir Pump



A stir pump can only be configured on an Inline dosing irrigation system and has been properly configured under the Configuration -> Dosing section. It will become active when the system is running an irrigation in order to help stir nutrient and pH injections through the output going water.

Field	Description
Output State	The current state of the output for the stir pump, *On* or *Off*
Switch Pos	The switch position of pump output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

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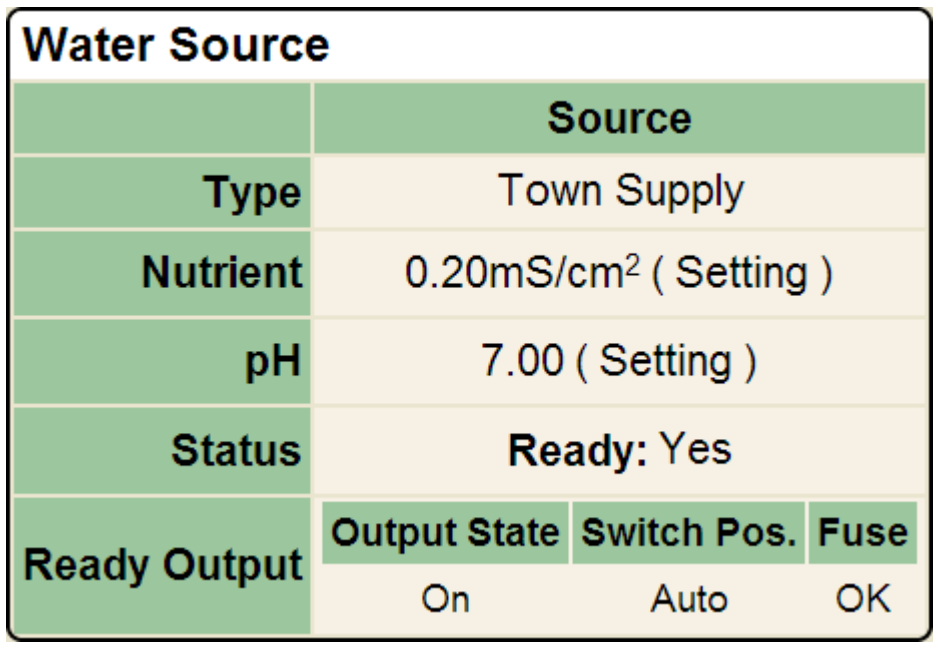
Water Source

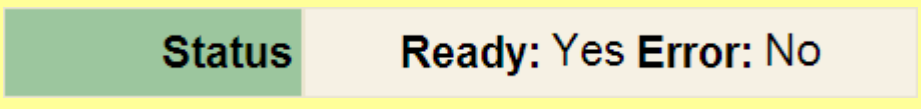
General Readings



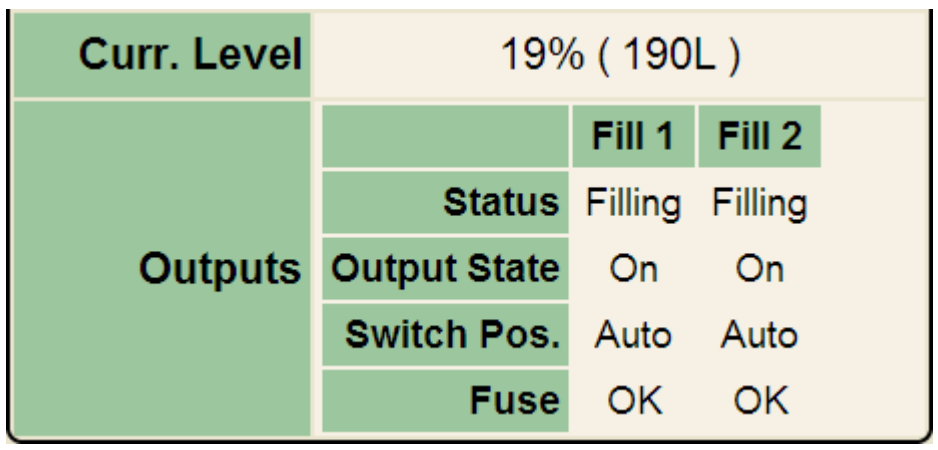
Depending on how a water source is configured the displayed information in this box will vary. Above visible readings for a town water source these are common readings among all types of sources.

Field	Description
Type	The current type of the configure water source, *Town Water* , *Tank* , *Blending Tank* or a *Main Tank*.
Nutrient	The current water source nutrient level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
pH	The current water source pH level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
Status	Whether the water source is ready. Note a town water source is always ready.
Ready Output	If a ready output has been installed on the water source the outputs information will become visible here. **Output State** The current state of the output for this injector, *On* or *Off*. **Switch Pos** The switch position of this injectors output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

If a water source has been configured as a tank or blending tank the status box mentioned above will contain a an error reading as well to indicate whether the current tank has an error condition present.



Tank Readings



Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field all the current readings for each fill output configured on tank are displayed. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the output for the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

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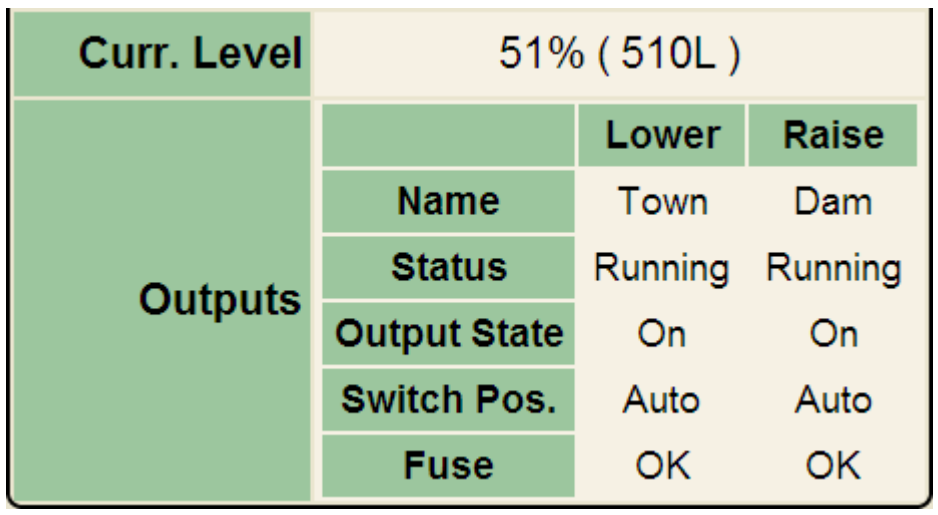
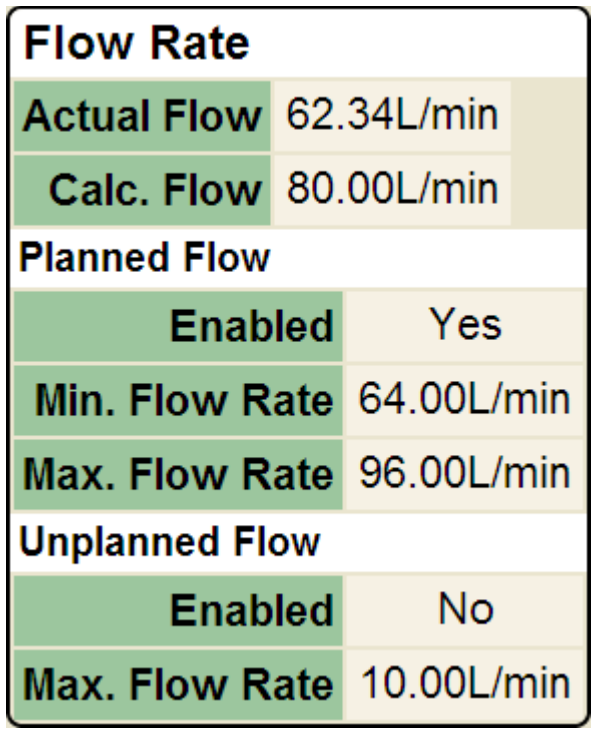
Blending Tank Readings



Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field the lower and raise fill output readings are displayed. **Name** Unique identifier given to this output. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

Flow Rate



For this box to be visble a flow meter must be correctly installed and configured on the irrigation system.

Field	Description
Actual Flow	Current flow rate being measured from the configure sensor source.
Calc. Flow	Current calculated flow the system is expecting to see based on its current state.
Planned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Min. Flow Rate	The minimum flow the system is allowed to have with generating an alarm condition, this is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Unplanned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on alarm level settings.

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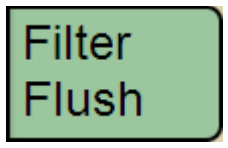
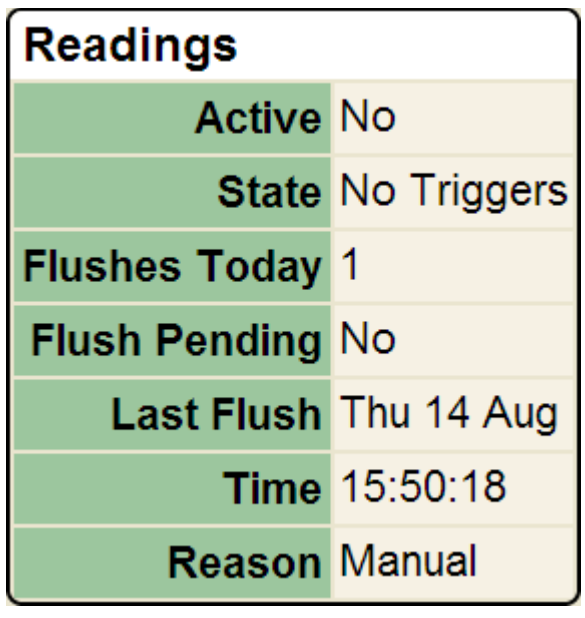
Filter Flush



If a filter flush is installed on the system a separate tab will be appear on the tertiary menu. When a filter flush is occurring the system is running water backwards through the pump. This means that irrigation's will be paused or unable to start during this period.

Settings

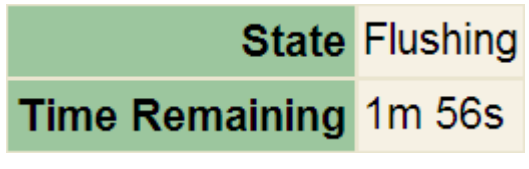
Readings



Active: Is the filter flush currently active.

State: Current state of the filter this can differ from the active reading and reflects other aspects of the filter flush system.

Time Left: Time remaining for the active filter flush cycle, this will only be displayed if the system is currently performing a filter flush.



Flushes Today: Number of flushes that have occurred today since midnight.

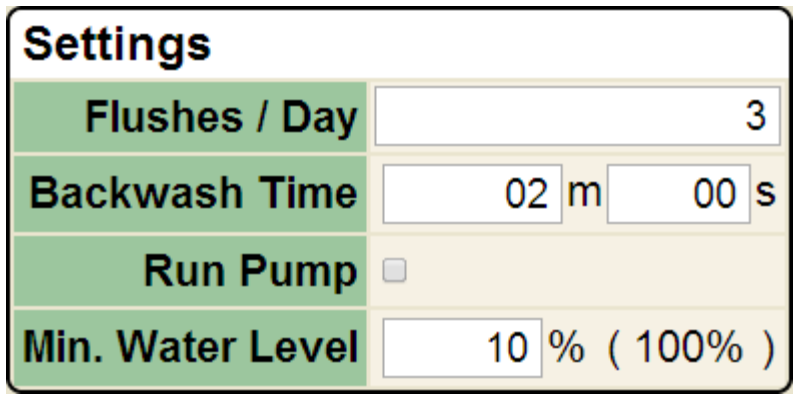
Flush Pending: If there is a flush pending the trigger source will be displayed here, a trigger can only be pending if the use of a flush window otherwise flushes will happen whenever they are demanded. If multiple triggers have occurred before the filter flush can run, the sources will be listed here.

Last Flush: Date of the last filter flush.

Time: Time when the last flush finished.

Reason: the trigger source for the last flush.

Settings



Flushes / Day: This sets the amount of flushes allowed per day, this is a maximum set point that can not be exceeded by any of the flush triggers except for a manual flush.

Backwash Time: The time it takes to run water backwards through the filter in order to flush it properly. This is time is sometime giving by the filter

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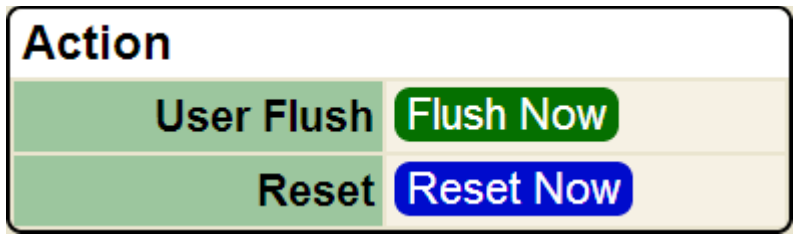
manufacturer. It may also be specified as a volume.

Run Pump: If this box is ticked when a filter flush becomes active the main system pump will also be turned on.

Min. Water Level: If a tank is the source water for the flush it might required more water then what is currently in the tank. Using this value it is possible to specify the amount of water that must be present from the water source in order to run a flush, otherwise it will not happen.

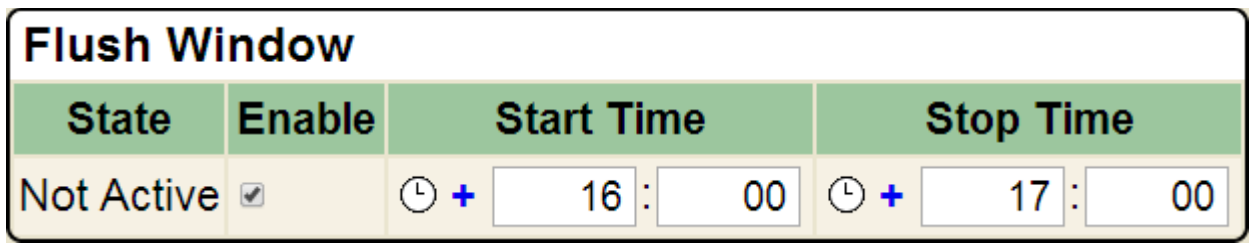
Action



User Flush: Triggers an immediate filter flush regardless of the state, once a filter flush has been activated this button will change to a cancel button, which will immediately stop the active filter flush.

Reset: Pressing the reset button will reset all automated triggers back to zero.

Flush Window



The flush window enables a set time of day for automatic flushes to occur. If a window is enabled the volume and interval triggers can only run between the time specified.

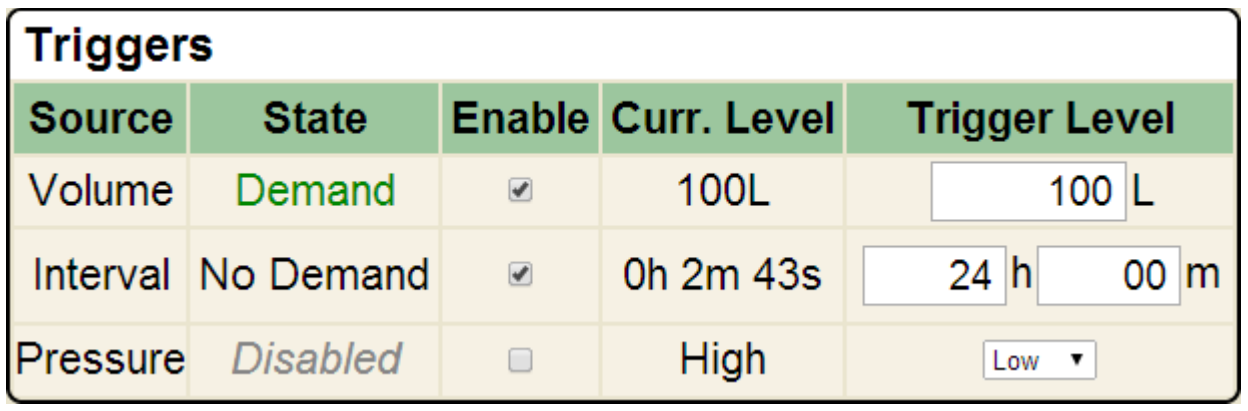
State: Current state of the window.

Enable: If a flush window is to be used on the system this value must be ticked.

Start Time: Time when the window starts, this can be a set time or an offset from sunrise/sunset.

Stop Time: Time when the window ends, this can be a set time or an offset from sunrise/sunset.

Triggers



There are three sources that can trigger a filter flush within an irrigation system. Both the Volume (actual only) and Pressure triggers required sensor input, if they are not installed a No Sensor error message will be displayed. The Volume and Interval triggers are bound by the flush window, so will only trigger during the window if enabled. All the triggers are also bound the number of flushes per today as well as the water source level. If any of these conditions are not meet but a trigger is demanded a Demand message will be disabled. Once a flush has completed the current levels will be reset, except for the pressure level since that is driven directly from a sensor. If any of the triggers are *Disabled* they will not be able to trigger.

Volume
A volume triggered filter flush is driven from either the calculated or measured volume on the system. If the measured volume is being used a flow meter must be correctly configured on the system.

Interval:
This is a simple time based triggered once a certain amount of time has passed since the last filter flush a new trigger will be generated.

Pressure
This is driven directly from a pressure sensor installed onto an EpM sensor within the system, this must be properly configured for this trigger to work.

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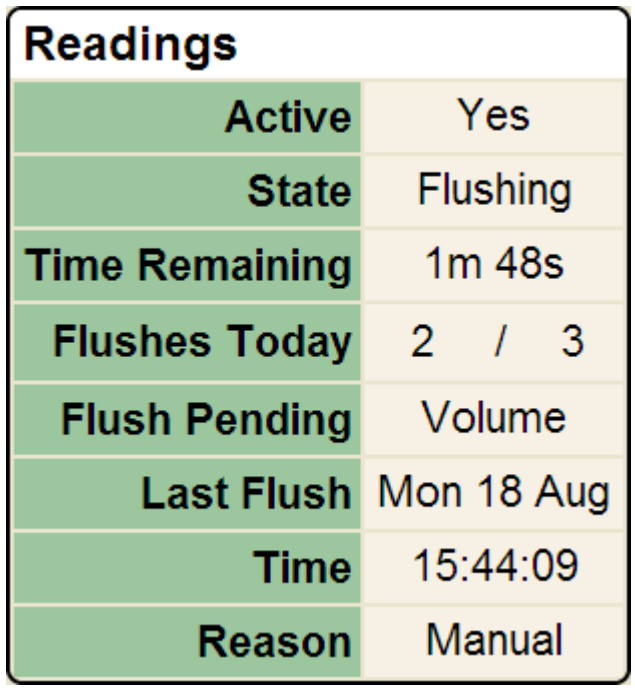
State: Current state of the trigger.

Enable: This box must be ticked if the source is to be used as a trigger.

Curr. Level: Current reading of the source.

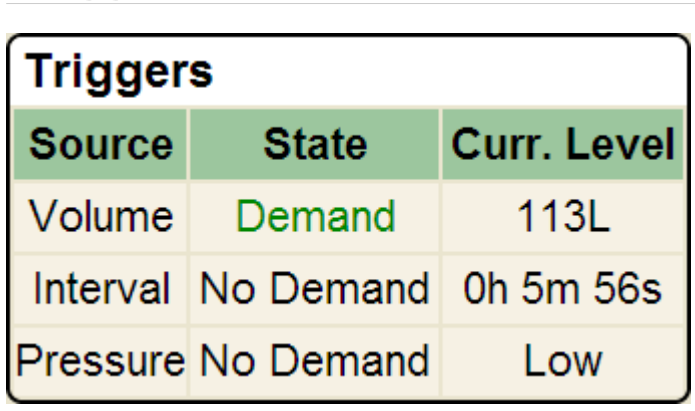
Trigger Level: Level the source reading is compared to in order to generate a trigger.

Readings



Field	Description
Active	Is a filter flush currently being performed by the system
State	Current state of the filter flush module.
Time Remaining	This reading will only be displayed if a filter flush is currently active on the system. It displays how long is left until the flush cycle has completed. This is reset to zero when the system reaches its end of day.
Flushes Today	Number of flushes that have occurred today out of the maximum total allowed.
Pending Flushes	If a flush window has been configured on the system or the number of flushes has been exceeded any triggers will be queued until it will be allowed to run again. The source of this queued flush will be displayed here.
Last Flush	Date of last flush performed by the system.
Time	Time of the day the flush occurred.
Reason	The trigger reason for this flush.

Triggers



Field	Description
Volume	State of the volume trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Volume	State of the interval trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Pressure	State of the pressure trigger on the filter flush module, this will only be displayed if the pressure trigger has been correctly set up on the water system configuration page. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level is driven directly from a sensor input and will only change based on physical feedback from the pressure sensor.

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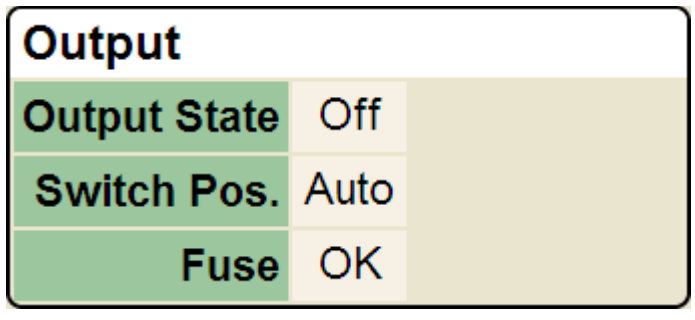
Outputs



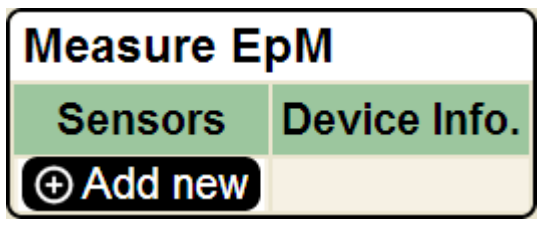
Field	Description
Output State	The current state of the filter flush output, *On* or *Off*
Switch Pos	The switch position of the output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Sensors

Each irrigation system can have a three different groups of sensors used for ob

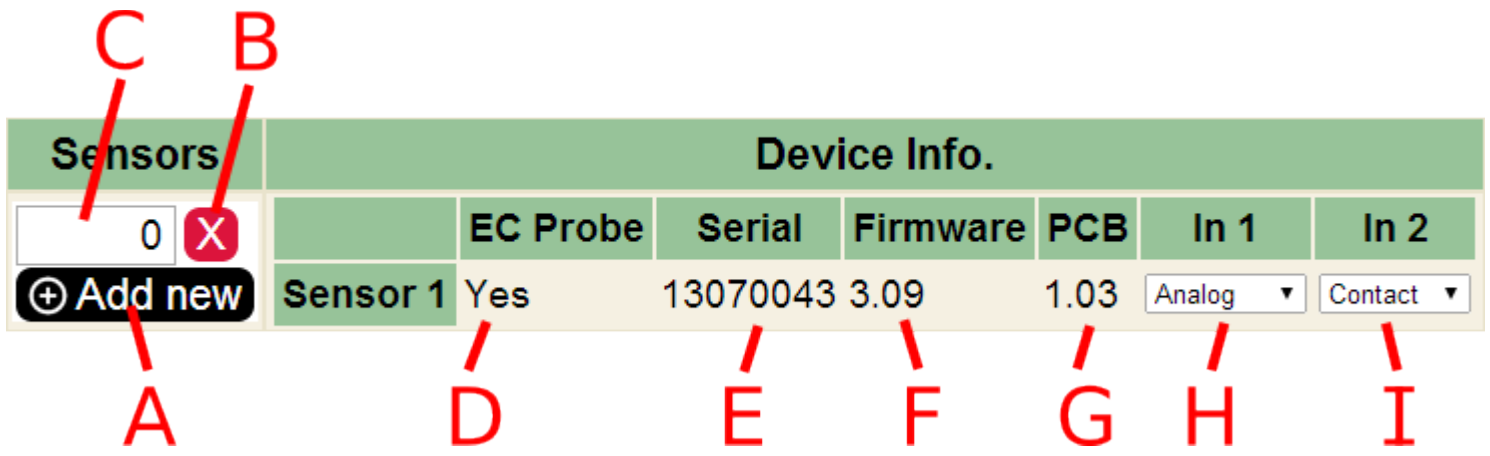
Configuration

Measure EpM



This is the group of readings designated for the main readings of the system. This group reports the Main Nutrient, pH and Flow for the system.

After adding a new Remote EpM to the sensor box the Sensors field and the device info. box will change.



Annotation	Name	Description
A	**Add new button**	Adds an EPM sensor
B	**Delete button**	Deletes an EPM sensor
C	**Sensor address**	The address of the sensor. Each box must be populated with the corresponding address of the EpM device
D	**EC Probe**	Does the Remote EpM currently have an EC Prove attached?
E	**Serial**	Serial number of the device connected under that address
F	**Firmware**	Current version of the firmware this device is running
G	**PCB**	PCB version of the device
H	**In1**	• **Contact:** Input 1 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to 5 - 10V when contact is made • **Analog:** Analog voltage is connected to input 1 of sensor • **Moisture:** Moisture probe is connected to Input 1 of sensor

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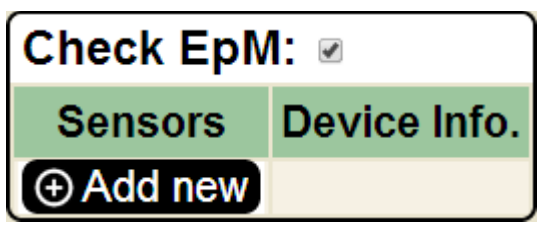
Annotation	Name	Description
I	**In2**	• **Contact:** Input 2 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to ground when contact is made • **Flow:** Input 2 is a flow meter input, again this should be pulled to ground when contact is made for correct operation

Sensor information is only available once the configuration has been activated by pushing the **Activate** button

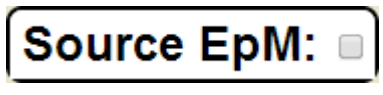
Check EpM

The Check EpM group is used for mainly error checking against the Measure EpM reading. It can also provided general contact closure inputs as well as analog inputs.

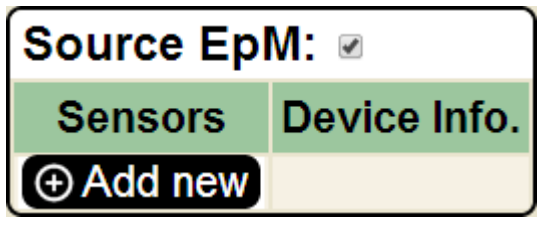


Check EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Source EpM

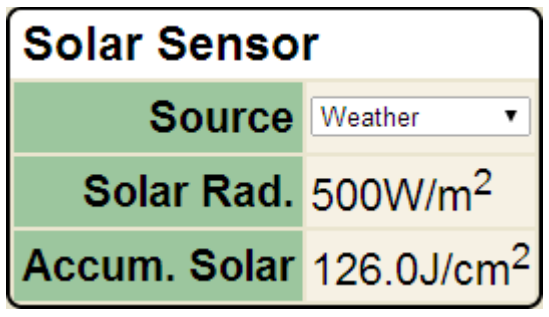


The Source EpM group is mainly used for input information to the system. I can be used to measure the incoming nutrinet and pH level of the systems water supply. It can also provided general contact closure inputs as well as analog inputs.



Source EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Solar Sensor



An irrigation system can have a solar source assigned to it which can be used through the system.

Source: Here the solar source can be specified, depending on which source is selected additional configuration options will be displayed.

- ***Weather:*** The systems solar information will be taking from the weather station.

  A Weather stations needs to be installed and properly configured for this option to be used correctly. See section config weather for information on this.

- ***Independent:*** The system uses the solar reading from a independent solar sensor.
- ***Compartment:*** The system will use the solar information from a specific compartment.

Solar Rad.: Current level of solar radiation that is being measured by the selected source.

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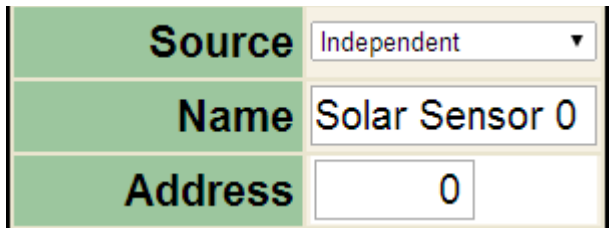
Accum. Solar: Accumulated solar radiation since last End of Day.

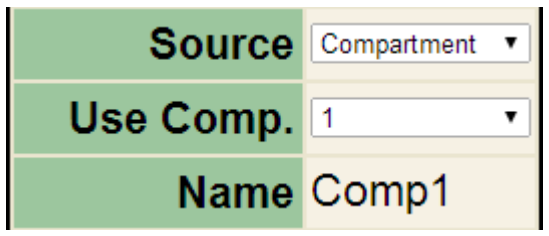
Independent Solar Source



Name: Text can be entered in this field to help identify the solar sensor attached to the system.

Address: The address of the rotary switch the desired solar sensor is set to.

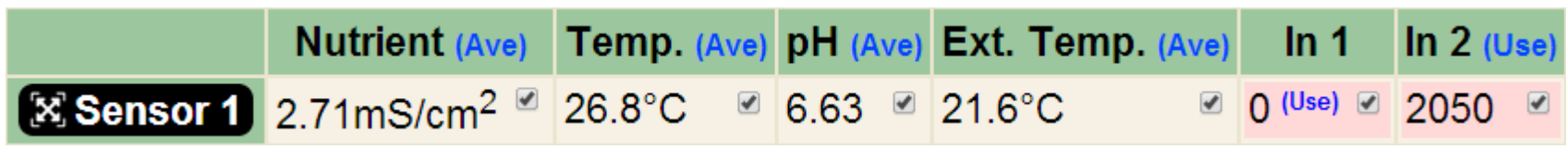
Compartment Solar Source



Use Comp.: The number of the compartment that is to be used be system in order to get solar information must be entered here. In order to use a compartment as a solar source the compartment must be probably configured see configuring climate section for information on this.

Name: Each compartment can be configured to have a name, this will be displayed here to help ensure the correct compartment has been selected as the solar source.

Overview



The black button that appears in the row heading of the table is an expansion button, this button is given the name of the sensor number added to the system. When this button is pushed additional settings for each sensor will be displayed.

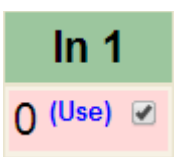
Field	Description
Nutrient	The current nutrient reading from the sensors. If this reading is 0.00 or XX check the connection of the EC probe to the Remote EpM sensors.
Temp.	Each Autogrow EC probe contains a temperature sensors which temperature is displayed here.
pH	Current pH being measured by the probe. Note that due to the nature of a pH measurement even without a probe connected a value can be displayed here.
Ext. Temp.	Current temperature being measured using the pipe temp sensor wired into the Temp pin of the Sensors B Connector. If a probe is not installed this temperature will appear of XX if a sensor is installed and XX is being displayed check the wiring of the probe.

In 1 & 2 Values

The values displayed in the Input 1 & Input 2 space will differ based on the In 1 setting on the configurations page, this needs to be set correctly to match the desired input signal. Since the type of variable can differ with the same column in the table each specific type of reading will be displayed in a different colour within the cell.

In 1:

- **CC Count 1:** Current count to contact closure input wired into Moist pin on connector B, the Contact options must be selected under configuration for this to be displayed.



- **Analog:** Current analog voltage being measured by the sensor. This will only be displayed if the sensors In1 value on the configuration page is set to Analog.

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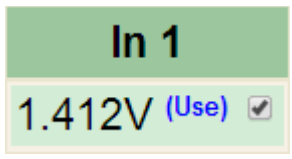
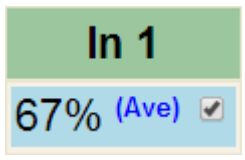
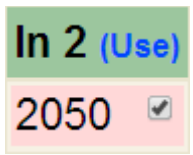


- **Moisture:** Current moisture level being measured by the sensors, the moisture option must be selected under configuration for this to be displayed.

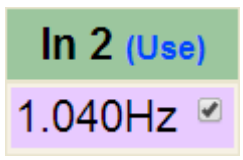


In 2:

- **CC Count2:** Current count of the CC input on the senosrs, this will only be displayed when contact option is selected under the In2 setting on the configuration page.



- **Flow Rate:** The raw flow rate in Hertz (frequency) that is being measured on the sensors. This is in relation to how many pulses a second the sensors is receiving (1 Pulse a second = 1 Hz). The Flow rate option must be selected under the In 2 setting on the configuration page for this to be displayed.



Some or all of the above values are Average Vars.

The addition of the above text and tick box means a variable is part of an averaged set. If the tick box is ticked this means the current reading and all other tick ones will be averaged together. This is useful in order to gain on overall sample of a particular reading. Any invalid readings (e.g. *XX°C*) are omitted from the average even if the box is ticked.

Some or all of the above values are Use Me Vars.

The addition of the above text and tick box means a variable is part of an use me set. If the tick box is ticked this means the current reading will be used as the main reading from the group of sensors. This is useful when multiple sensors within a single group are installed but only one is used for the specific reading. If multiple of the same use me vars are ticked, the system will use the value from the lowest sensor number as the reading (e.g. *Sensor 0 RH* will be used over *Sensor 1 RH*).

Additional Options

Each sensor can be individually calibrated in order to achieve the most accurate readings. Pressing the See All button will return you to the sensors overview page where other sensors additional options can be navigated to.

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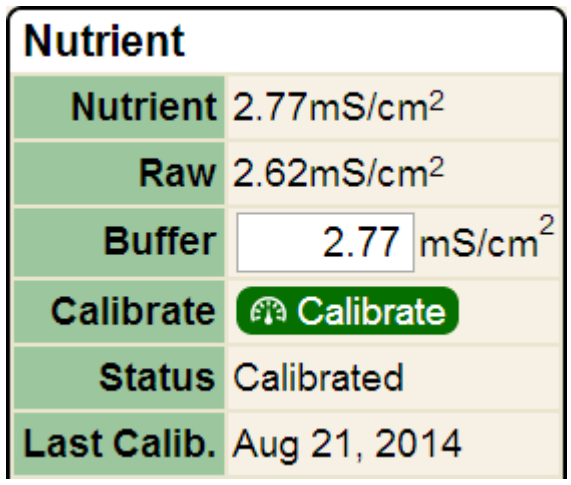
Nutrient

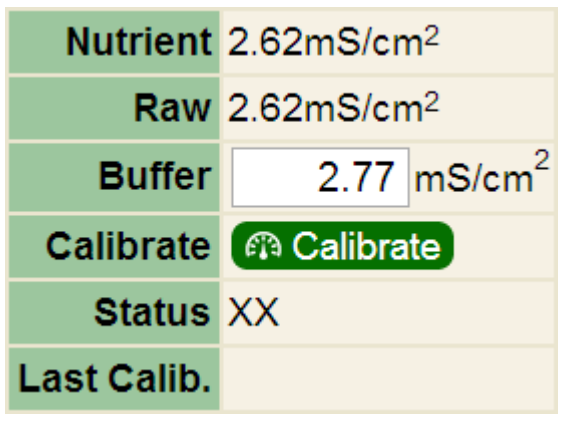


Field	Description
Nutrient	Current value of the nutrient, this is the value after the reading has been passed through the calibration it is the one that will be added to the average.
Raw	This is the raw reading coming from the sensor before calibration. This can differ from calibrated reading by quiet a lot. This value is displayed in order to give an indication of whether a new calibration should be performed.
Buffer	This is the calibration solution being used, default is 2.77mS/cm^2. This value can be changed to any value of buffer solution.
Calibrate	Pressing the Calibrate button will calibrate the current nutrient reading to the buffer solution set.
Calib	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

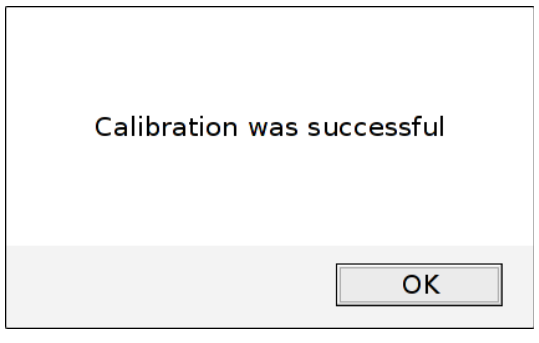
Nutrient Calibration Procedure

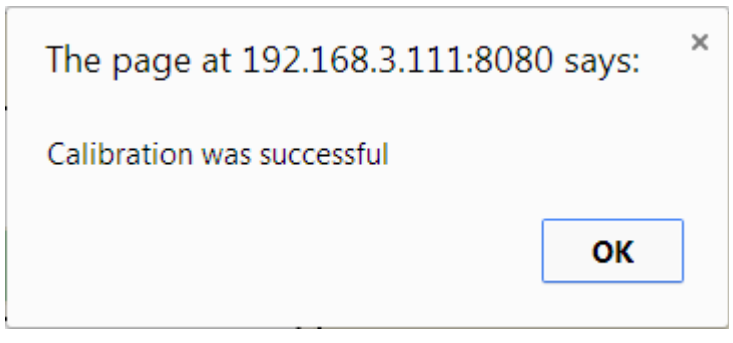
For each Remote EpM sensor within a group that is to be used for nutrient measurement it is recommended to calibrate the probes once a month.

- Clean & rinse the nutrient probe face
- Place the probe into the calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.



- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the nutrient and the temperature to stabilize (Recommended 5 Minutes).





- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.

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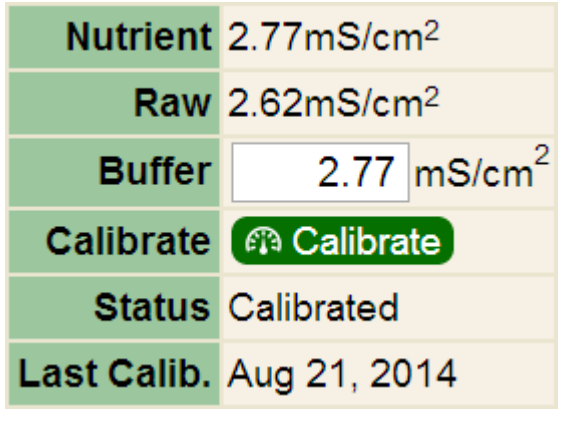
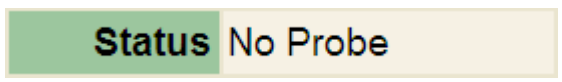
- After a successful calibration the Calib message and time will be updated.

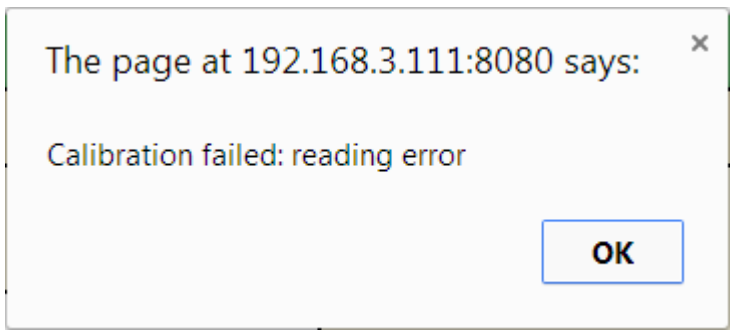


Calibration Errors

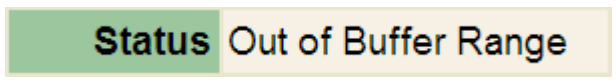
- **No Probe**



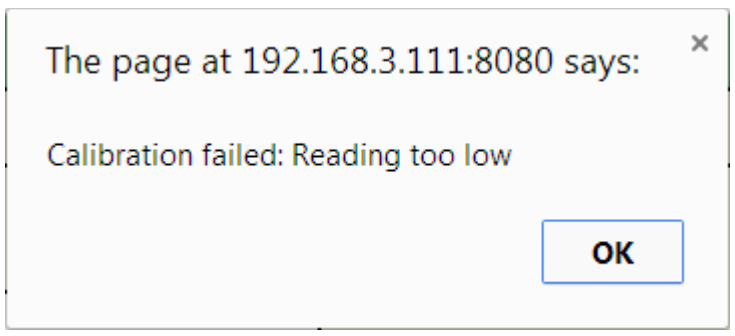
No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.

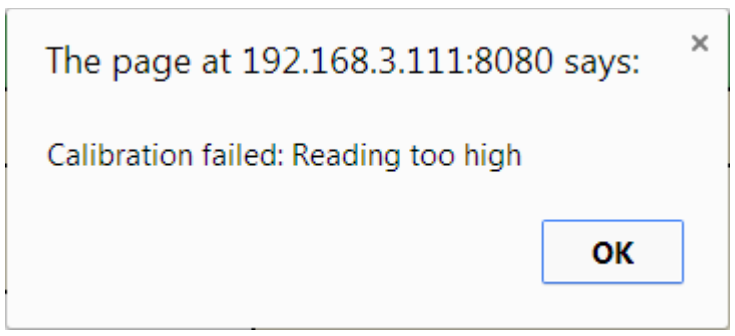


- **Out of Range**

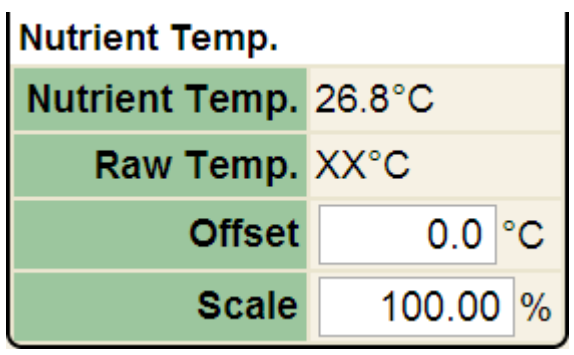


Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.





Nutrient Temperature



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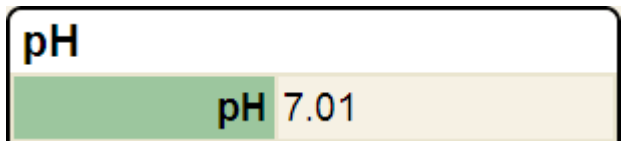
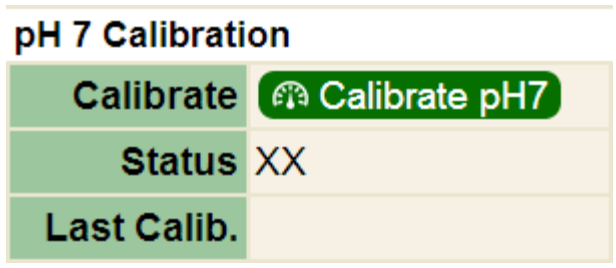
Field	Description
Nutrient Temp.	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

pH



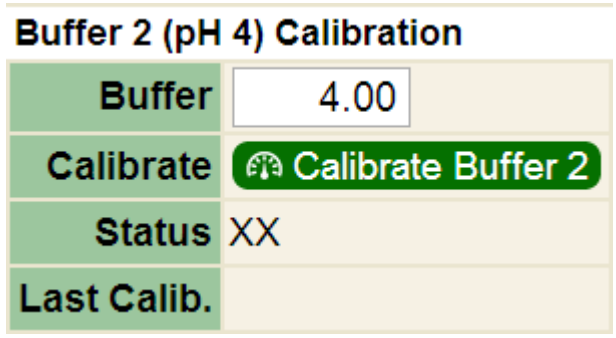
Field	Description
pH	Current pH value being reported by sensor.

Buffer 1 pH 7



Field	Description
Calibrate	Pressing this button will start a pH7 calibration.
Status	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Buffer 2 (pH4)



Field	Description
Buffer	pH value of the second buffer used in the pH calibration, this is usually a pH buffer of 4 but can be any other different pH level solution.
Calibrate	Pressing this button will start the second buffer calibration.
Status	Displays calibration information about the sensor.
Last Calib	Display the last calibration date for the sensor.

pH Calibration Procedure

For each Remote EpM sensor within a group that is to be used for pH measurement it is recommended to calibrate the probes once a week to compensate for aging electrodes.

- Rinse the pH Electrode in fresh water.
- Place the probe into the pH 7 calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

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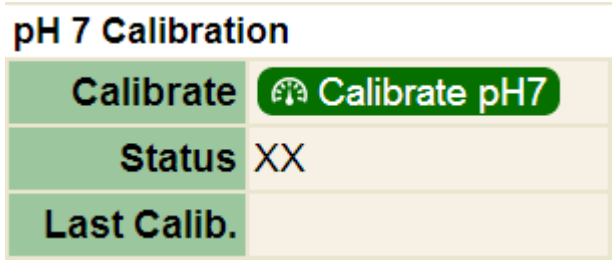
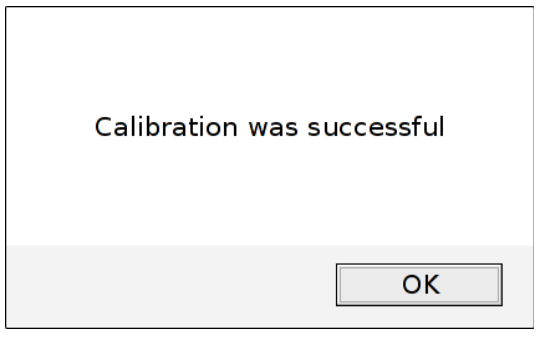
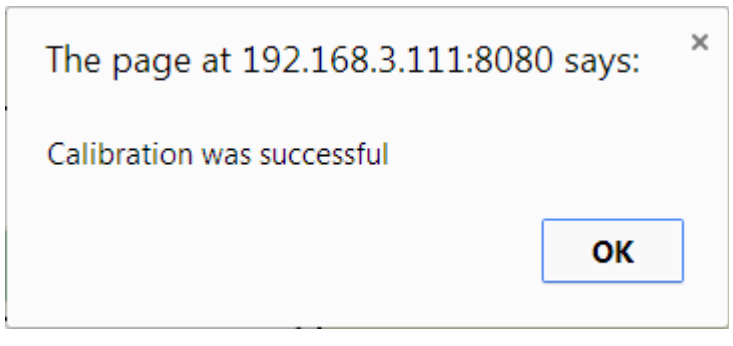
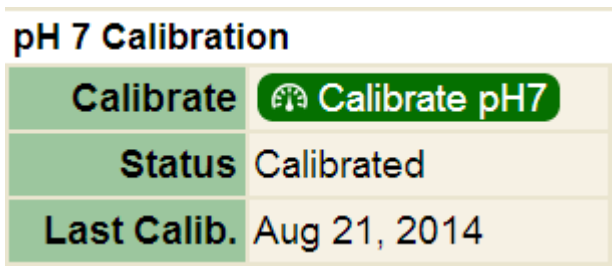


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).

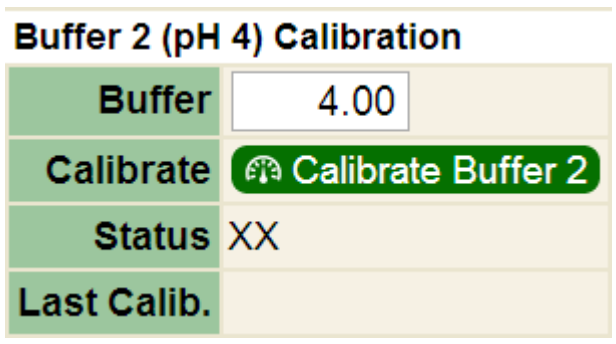




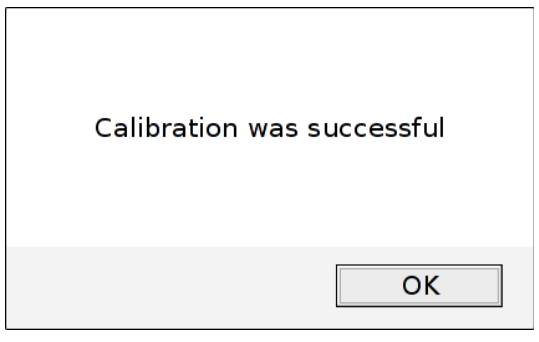
- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- Press the activate button before moving on to the second point calibration (pH 4).
- After a successful calibration the Calib message and time will be updated.

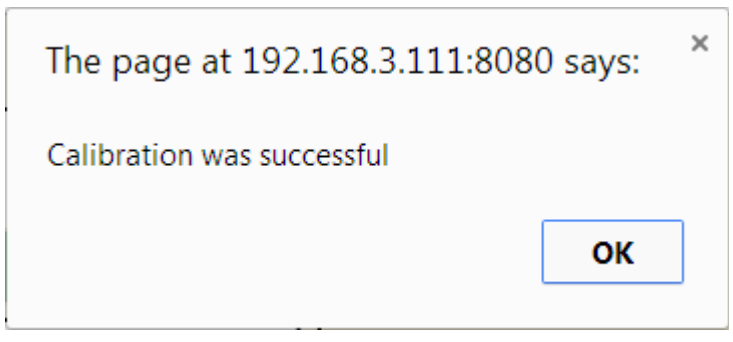


- Rinse the pH Electrode in fresh water.
- Place the probe into the second (pH 4) calibration solution.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.



- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).





- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

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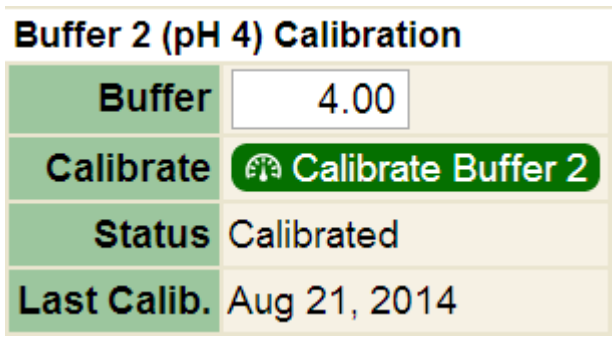
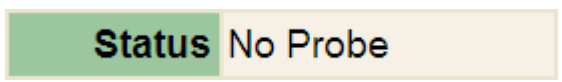
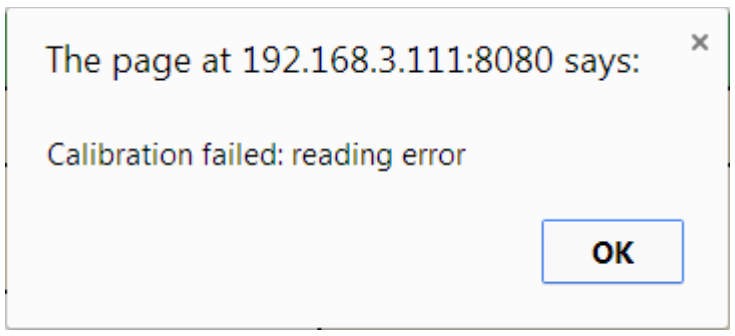


Calibration Errors

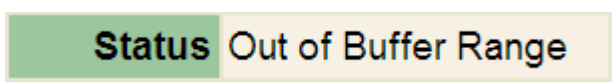
- **No Probe**



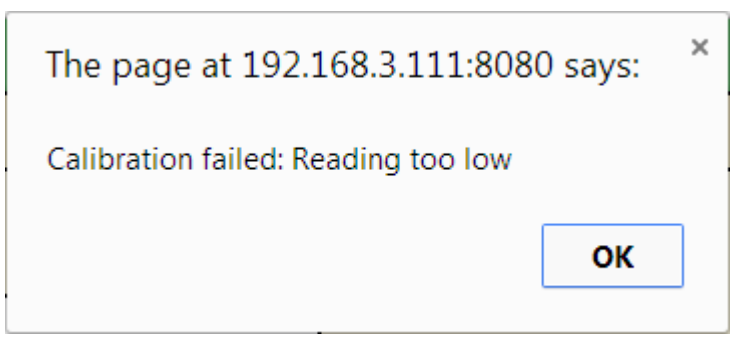
No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.

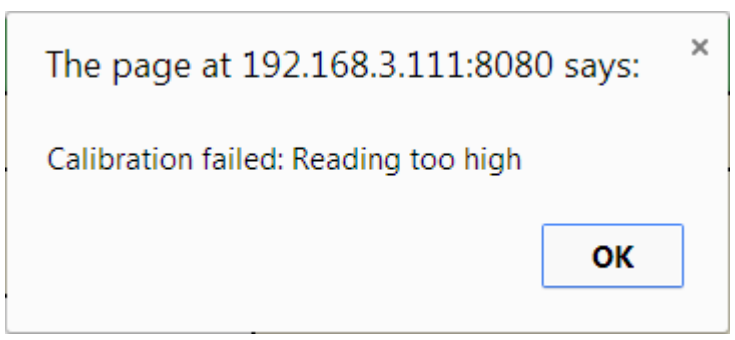


- **Out of Range**



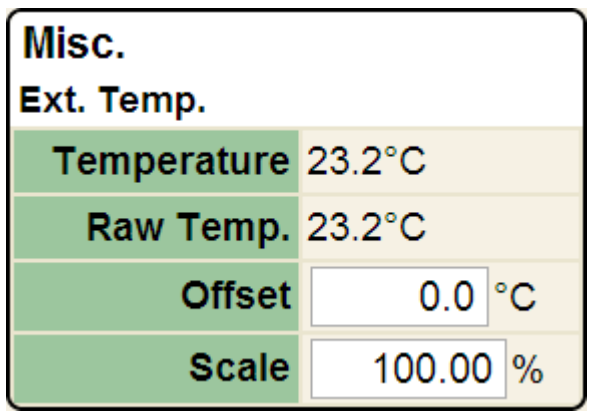
Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.





Misc.

External Temperature



Field	Description
Temperature	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.

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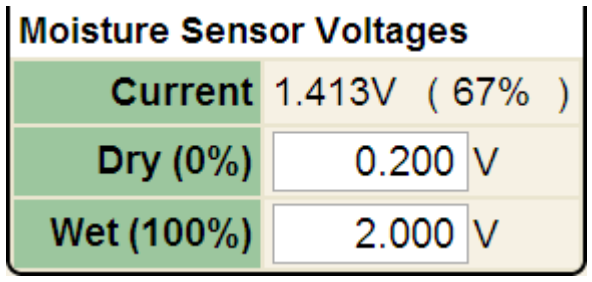
Field	Description
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

Moisture

The moisture probe options box will only appear if the input 1 type has been selected under the configuration page.

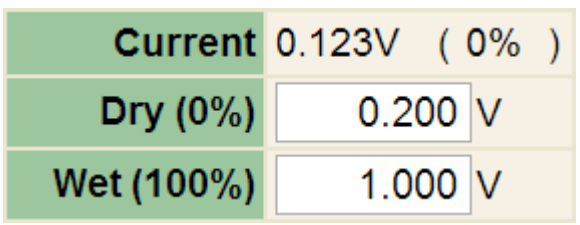


Field	Description
Current	Current voltage being measured by sensors from the moisture probe.
Dry (0%)	Voltage when probe is completely dry.
Wet (100%)	Voltage when probe is completely wet.

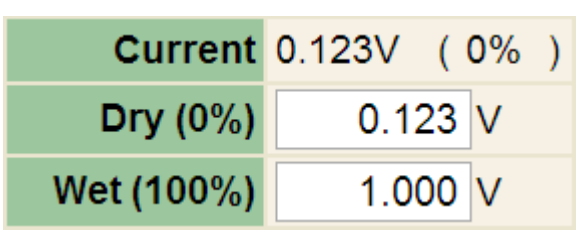
Moisture Probe Calibration Procedure

For each Remote EpM sensor within a group that is to be used for moisutre measurement it is recommended to calibrate the probes before using them, this usually only needs to be done once for a probe.

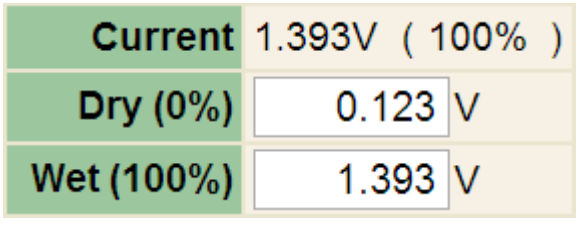
- First make sure the probe is completely dry.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate. And navigate to the Moisture Sensor Voltages box, note this will only be visible if the Input 1 type has been set to Moisture on the configuration page.



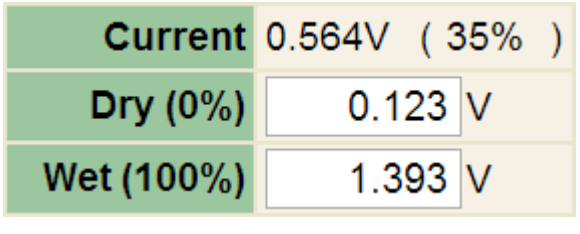
- Set the Dry setting value to match the current voltage being read from the sensor.



- Place the probe in to a glass of water, this is to ensure 100% wet of the probe for accurate calibration.
- Set the Wet setting value to match the current voltage being read from the sensor.



- Once these two settings have been enter, save and activate the settings to complete the calibration.
- Once completed the probe can be placed into desired media for normal operation.



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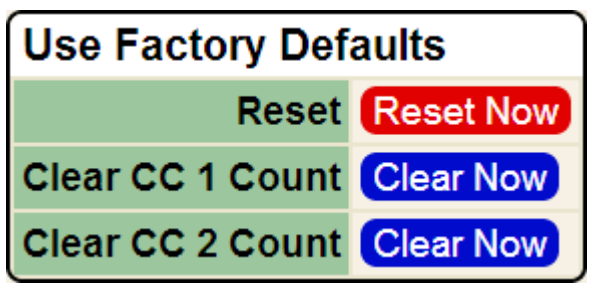
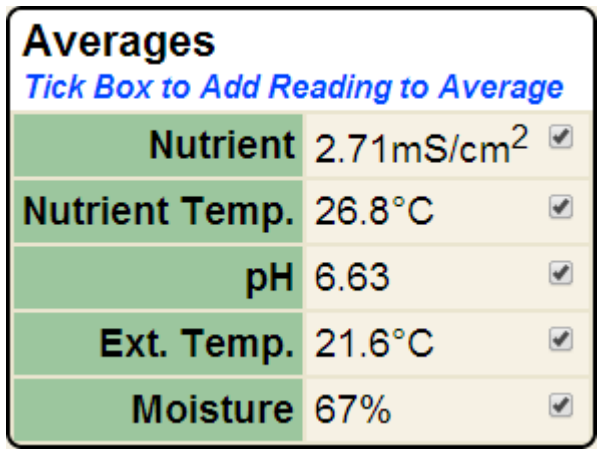
Use Factory Defaults



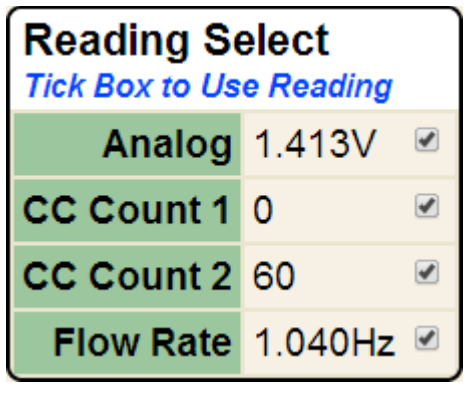
Field	Description
Reset	Pressing this button will reset all calibration constants for Nutrient and pH. This button will not effect the offset and scale settings.
Clear CC 1 Count	Manually reset the contact closure count of Input 1 back to zero.
Clear CC 2 Count	Manually reset the contact closure count of Input 2 back to zero.

Averages



This box lists all values that are supplied by a Remote EpM senosrs that can be averaged together. This will display variables even if they are not selected as an input on the configuration page.

Reading Select



This box lists all values that are supplied by a Remote EpM senosrs that can be select to be used as the main reading out of the set. This will display variables even if they are not selected as an input on the configuration page.

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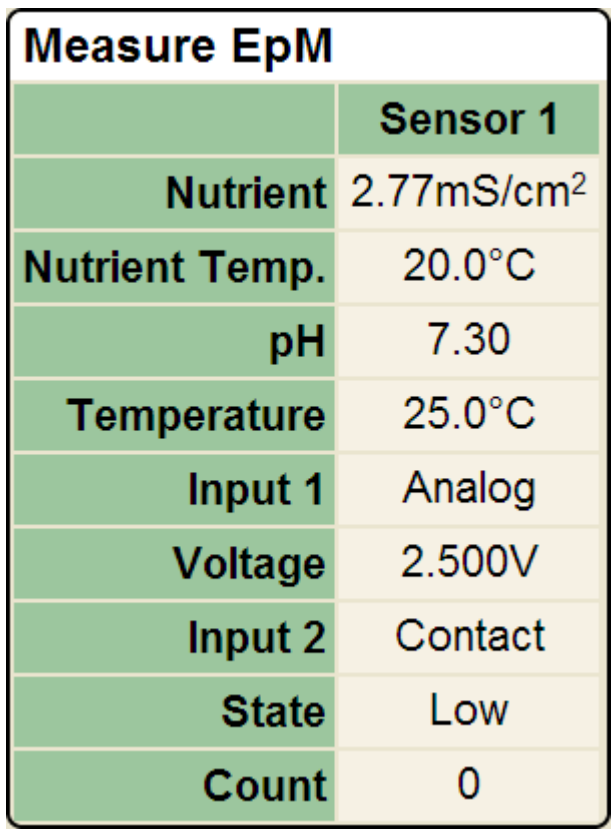
Readings

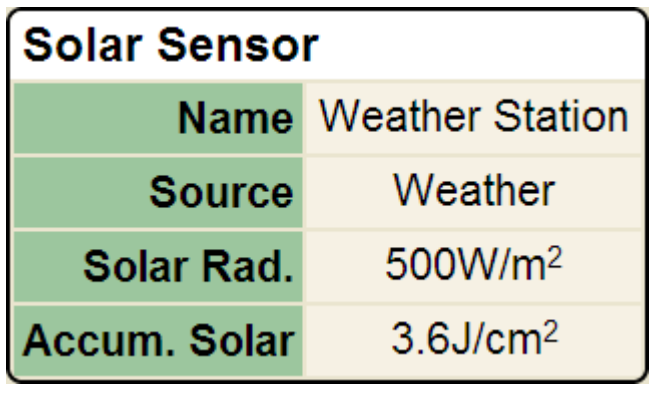
EpM Sensor's



The above field displays the readings for every sensor within the Measure EpM group. All the readings from each sensor and each group are the same as pictured above, this includes the Check and Source EpM groups.

Field	Description
Nutrient	The current nutrient reading from the sensor if this is every 0.00mS/cm&sub2 check the probe. A reading this low should not be possible if the probe is in water. A reading of this suggest the probe is no longer submerged in water.
Nutrient Temp.	Current temperature of the water the probe is submerged in. Note due to the nature of the material the probe is made from the thermal conductance of the probe is rather low, this means a change in temperature of the water may take a while to effect the actual temperature displayed here.
pH	Current pH level of the water.
Temperature	The temperature of the Stainless steel External temperature probe wired into the sensor this will appear as XX if not connected or an error has occurred.
Input 1	What the current input wired into the Analog input pin of the sensor is, this will only effect what is displayed in the box below.
Voltage / Moisture / Count	Depending on how Input 1 is configure the variable here will be listed accordingly. *Voltage* Current voltage on the input pin. *Moisture* Current moisture in percentage based on the sensor settings. *Count* Current count of the input pin.
Input 2	What the current input wired into the CC input pin of the sensor is, this will only effect what is displayed in the box below.
Count / Flow	Depending on how Input 2 is configure the variable here will be listed accordingly. *Count* Current count of the input pin. *Flow* Current calculated flow rate based on the frequency being supplied by the input.

Solar Sensor



Field	Description
Name	Name given to the solar sensor this will vary depending on the source

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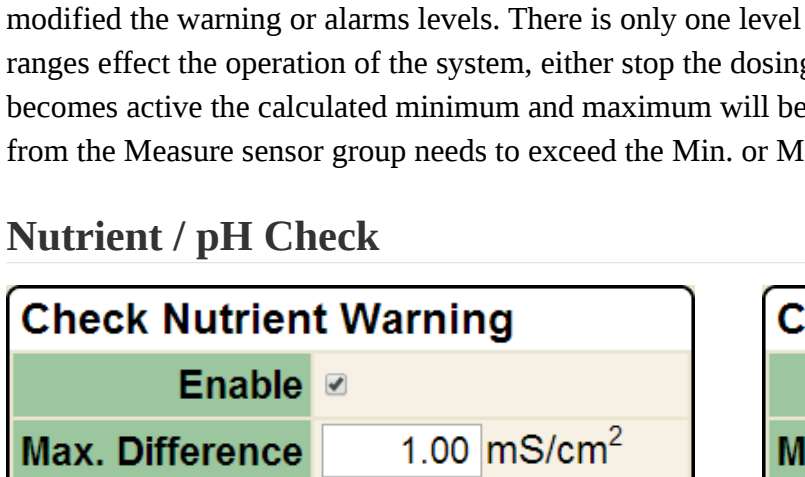
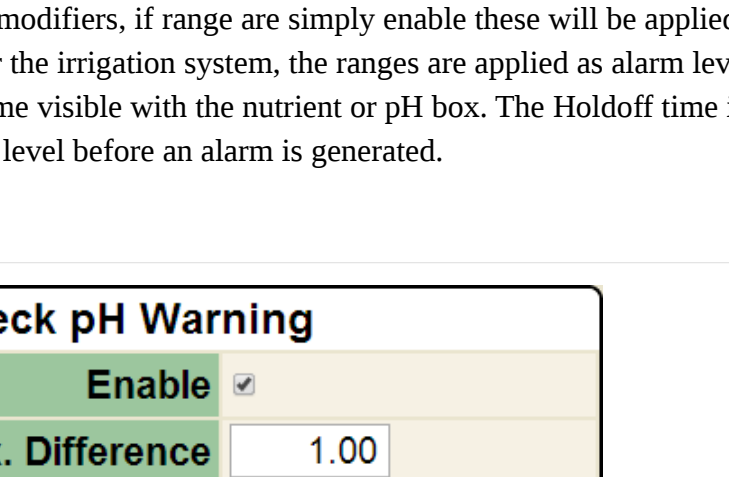
Field	Description
Source	Current solar source configured on the system on the Configuration -> Sensors page.
Solar Rad.	Current solar radiation reading being measured from the sensor. If this is XX check the sensor is correctly configured.
Accum. Solar	Accumulated solar for the system based on the configured solar source, this is reset at the systems end of day.

Alarms

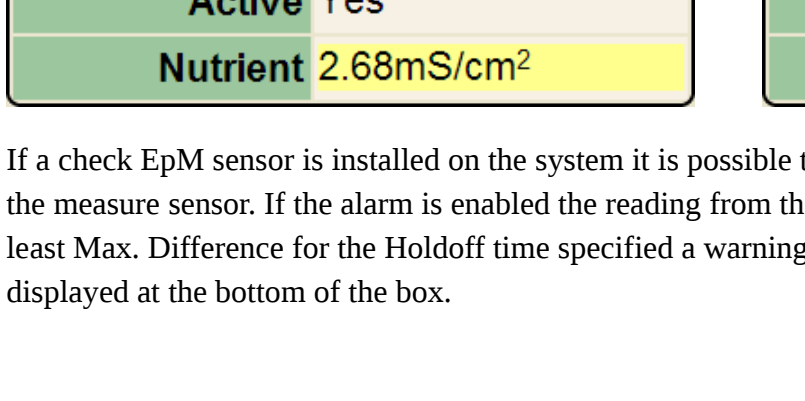
Nutrient / pH Measure

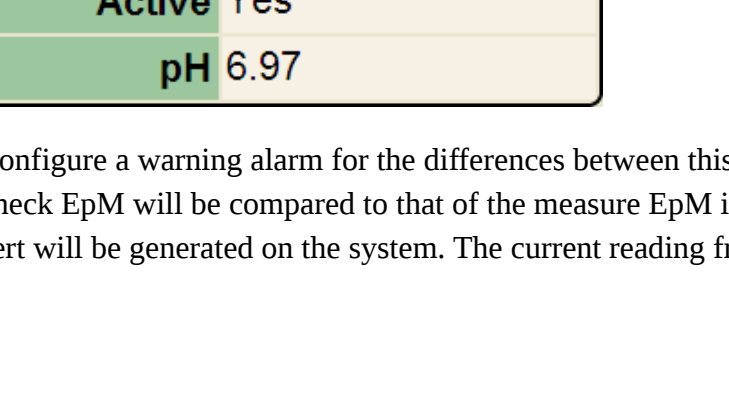
Warnings





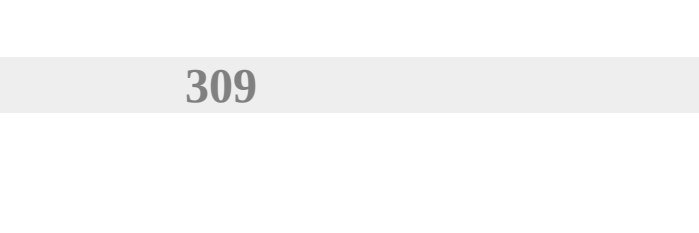
Alarms





A group based irrigation system such as inline can have multiple targets form different program throughout the day, because of this the warning and alarm levels for each group can differ and become active when the program dose. Under a group program the ranges must first be enabled in order to modified the warning or alarms levels. There is only one level of modifiers, if range are simply enable these will be applied as warning levels. If the ranges effect the operation of the system, either stop the dosing or the irrigation system, the ranges are applied as alarm levels. When a program becomes active the calculated minimum and maximum will become visible with the nutrient or pH box. The Holdoff time is how long each reading from the Measure sensor group needs to exceed the Min. or Max. level before an alarm is generated.

Nutrient / pH Check



If a check EpM sensor is installed on the system it is possible to configure a warning alarm for the differences between this sensors readings and that of the measure sensor. If the alarm is enabled the reading from the check EpM will be compared to that of the measure EpM is these reading differ by at least Max. Difference for the Holdoff time specified a warning alert will be generated on the system. The current reading from the Check EpM is also displayed at the bottom of the box.

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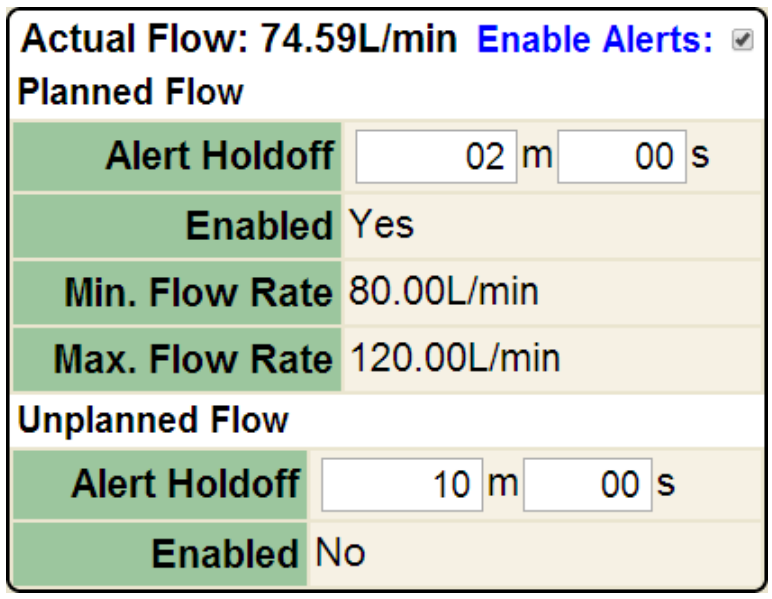
Flow Rate Alarms

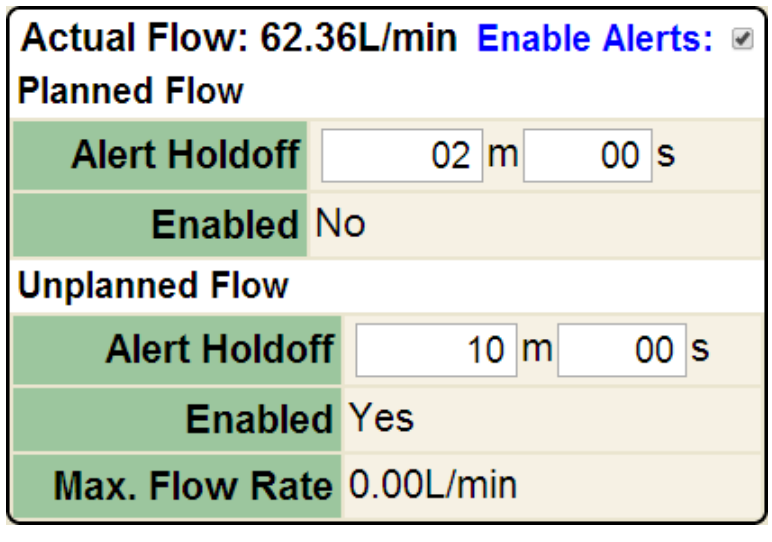
If a flow meter is installed on a system the flow rate alarms can be configured under the water system tab. Here the currently active flow alarms will be displayed. An irrigation system has two flow rate alarms that become active under different conditions (Planned and Unplanned), it is no possible for both of these alarms to be active at the same time.

Planned



If the system has been set up for planned flow alarms these will be displayed here whenever flow is predicted on the system. The minimum and maximum flow calculated for the system are displayed here. If the flow goes outside of these bounds for the holdoff time an alarm will be generated. There are no warning for flow alarms they are always treated as alarm level events, depending on how the flow alarms have been configured it is possible that this alarm will stop the dosing or the whole irrigation system.

Unplanned



If the system has been set up for unplanned flow alarm it will be displayed here whenever no flow is predicted on the system. The maximum flow is a set level defined under the water system per time period and if the flow goes above this level for the holdoff time an alarm will be generated. There are no warning for flow alarms they are always treated as alarm level events.

Watering System

A watering type irrigation system does not have control or does not required any dosing to be performed. A watering system is used to irrigated untreated water to desired stations from a water source. The system can support up to 150 different stations organized in to 10 watering groups.

General

Each system has a number of generalized settings which can be found on the top tab settings or configuration page labelled as General, and the status tab on the readings page. These areas are used to display the current general information for the system and any generalized setting or configuration options which are not specific to a particular component within the system.

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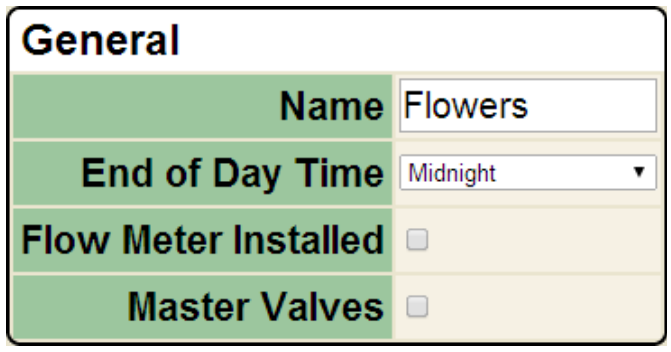
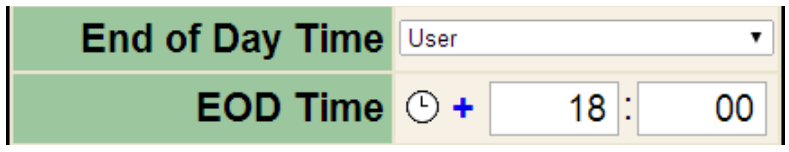


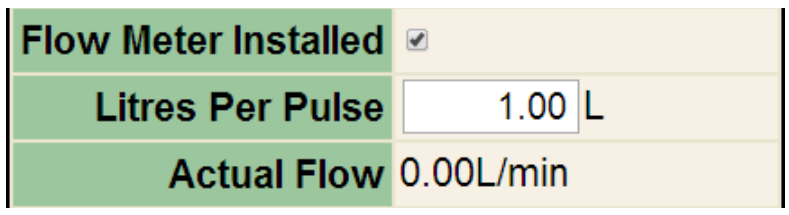
Name: Name for the current system, this is the same setting as found on the summary page.

End of Day Time: An Irrigation system has a few different readings which need to reset daily, this option allows you to select whether these variables are reset at Midnight local time or at a specific time of the day.



EOD Time: If the End of Day Time has been set to User this option will become available. Here a specific time of day can be used to reset specific readings.

Flow meter Installed: If the system has a flow meter installed that is used to measure the irrigation flow this box needs to be ticked.



Litres Per Pulse: This setting box is only displayed once the Flow meter Installed box has been ticked. Here the flow rate of the installed meter must be specified, this value should be specified by the manufacturer of the flow meter.

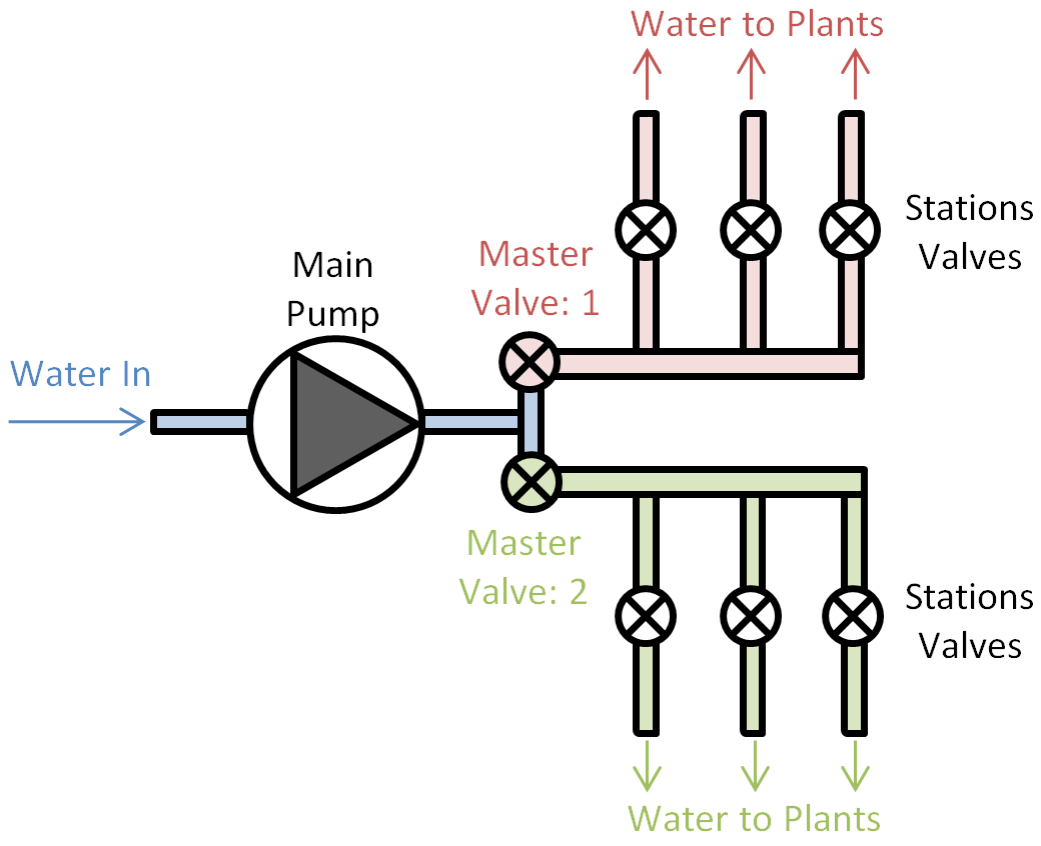
Actual Flow: This is the current flow rate being measured by the system.

> A Remote EpM sensor must be configured in the system before this reading will display correctly

Master Valves: If the system has master valves this box needs to be ticked in order to configure them. This option is not available on a continuous type system, master valves can only be installed on systems that control the watering side of the irrigation.

Master Valves

A master valve is used if the system has multiple pipes going for a single irrigation source to different crops. They physically separate the pipe lines for different stations (zones).



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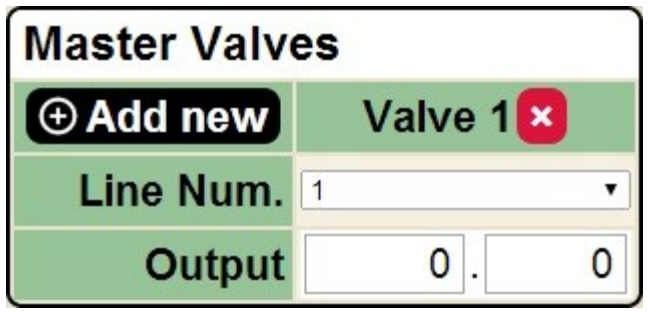
Adding a Master Valve

Pressing the add new button will add a new master valve into the irrigation system, once a new valve is installed it can be configured.



Line Num.: This is a logical line number associated with a certain master valve, this number is used when assigning Stations (zones) to a line.

Output: Address of the output expander this master valve is wired to, see section blah configuring a single output for more information.

Time Periods

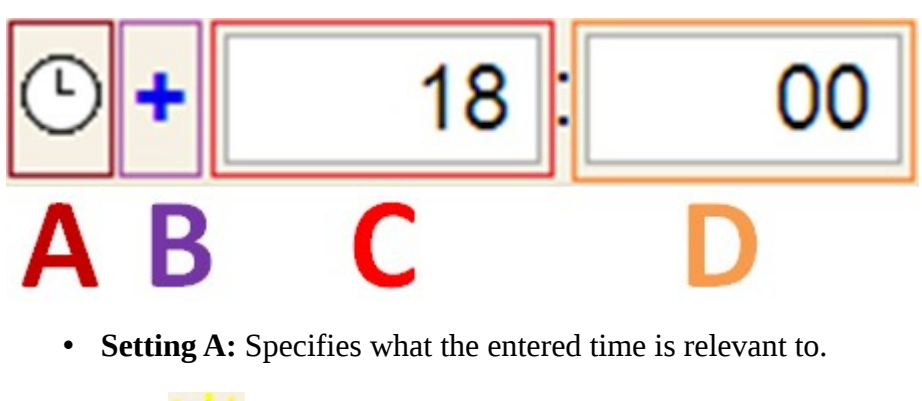
Time periods for the system can be defined here, up to 5 time periods can be supported by each component within a manager. can be defined as a time of day, offset from sunrise or offset from sunset. The name of the time period is not important for control but very useful when configuring time period dependent variables. Whenever one of these variables is displayed in the system it will appear within a list of all configured time periods so is very important to make the names of each time period something to help identify. Useful names could be the times of day (7am-10am), solar events (Sunrise, Noon), specific time period purposes (Heat trap, RH purge), Times of the day name (Dawn, Morning) or any other useful identifier.

Name: Specify unique name for this time period.

Start Time: Specify the start time for this time period.

Configuring a Time of Day variable

A time of day variable are used through out the Multigrow system they are variables that will cause a specific event to happen at a specified time.



- **Setting A:** Specifies what the entered time is relevant to.
  - Selecting this icon means that the specified time is an offset from sun rise.
  - Selecting this icon means that the specified time is an offset from sun set.
  - Selecting this icon means that the specified time is a positvie offset from midnight, this is the same format as standard 24 hour time, 07 00 = 7 hour offset from midnight (7am), 19 00 = 19 hour offset from midnight (7pm).
- **Setting B:** States whether the offset being applied is positive or negative to the time specified. Note, when using a normal time this will be positively applied regardless of the setting.
  - The time specified is a positive offset from the first setting.
  - The time specified is a negative offset from the first setting.
- **Setting C:** The offset time hours are specified here.
- **Setting D:** The offset time minutes are specified here.

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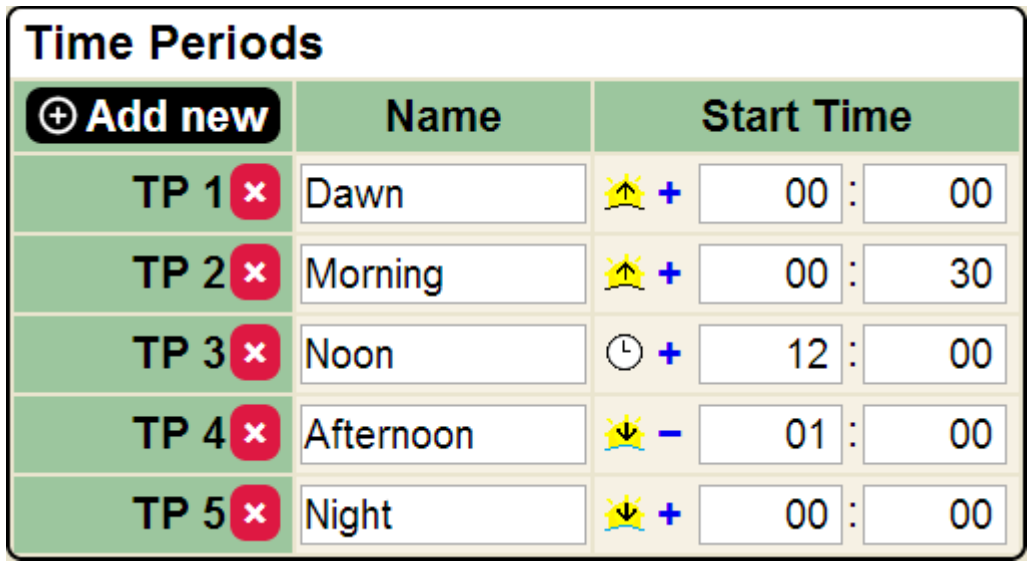
Using time periods



Each time period is active from the time specified within the box until the time of the next period. In the above configuration you can see a combination of various types of time periods.

If we take Sunrise to be 7:00am and Sunset to be 5:30pm, the time periods for the day work out to be;

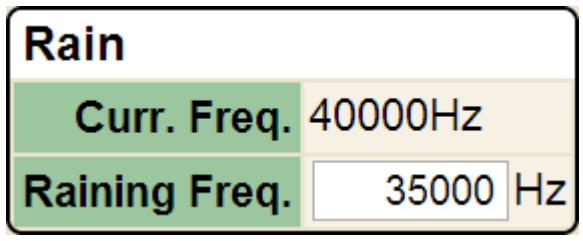
Time Period	Name	Start	Stop
1	Dawn	7:00am	7:30am
2	Morning	7:30am	12:00pm
3	Noon	12:00pm	4:30pm
4	Afernoon	4:30pm	5:30pm
5	Night	5:30pm	7:00am

Settings

Time Periods

The first box visible on this page is used to configure the time periods of the system. These settings are identical to the one found on the configuration page, please refer the configuration section above for more information on this settings box.

Rain

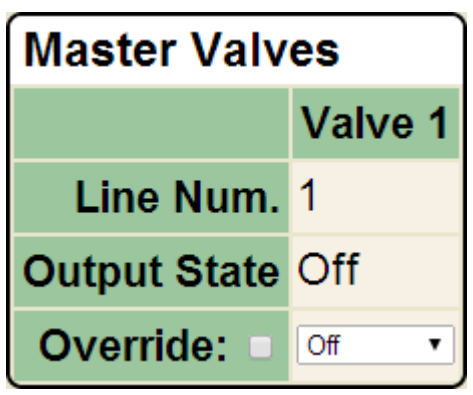


An irrigation system can use rain to reset certain triggers within a system, here the setting for this can be modified. Note a weather station is used to supply the status of the rain to the system and must be properly configured for this functionality to work correctly.

Curr. Freq.: Current frequency being measured by the weather station.

Raining Freq.: Frequency in which this particular irrigation system deems it to be raining.

Master Valves



Master valves have only one setting which can be found within this box they can only be overriden to a set level.

Line Num.: The line number assigned to the master valve.

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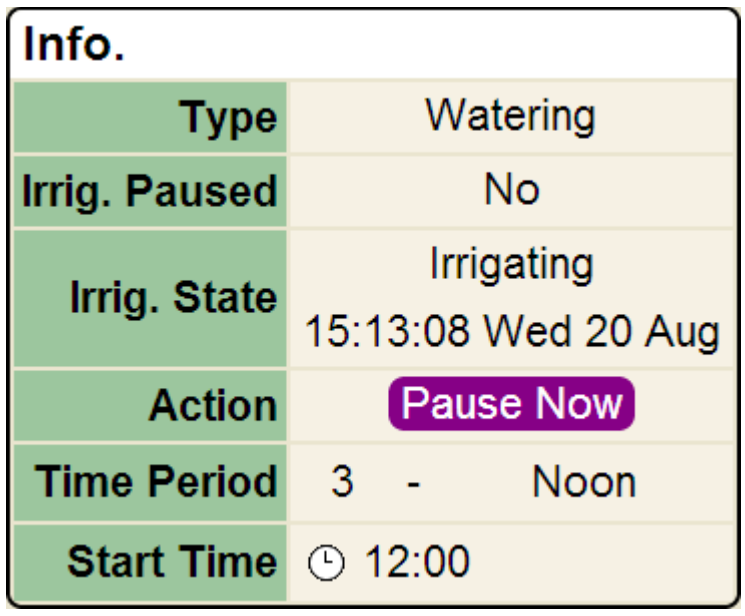
Output State: Current state of the master valve output.

Override: Ticking this box will software override the output to the state specified in the drop down box.

Readings

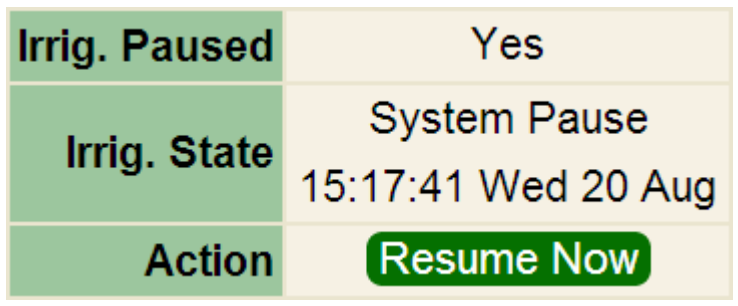
The Readings -> Status page for any irrigation system contains a quick snap shot of the systems current state. A small selection of important readings for each installed module will be displayed here.

Info.



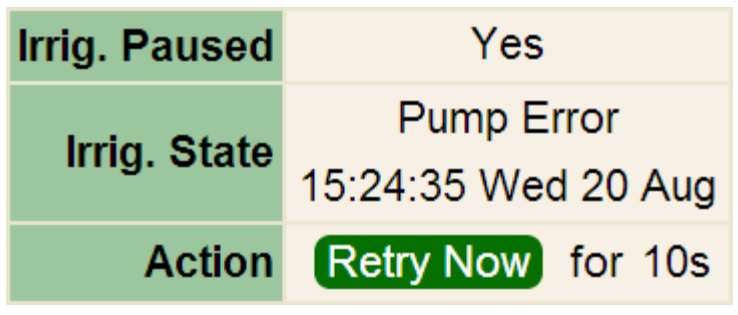
Field	Description
Type	Configured type of irrigation system.
Irrig. Paused	Is the system currently paused.
Irrig. State	Current state of the irrigation system and what time it changed to it.
Action	User action buttons are displayed here, different buttons will be displayed depedning on the state of the system.
Time Period	The current active time period on the system, included the number of period and the name given to it.
Start Time	Start time of the current time period.

Action - Pause Now



If the pause now is pressed while an Irrigating is active the whole system will be paused, when this happens the Action button will be changed to a Resume Now button and the Irrig. State will change to System Pause. When resumed the system will start up from where it was last in the irrigation cycle.

Action - Retry Now



If an error occurs on the system that means it should stop running the current irrigation will be paused. However some error such as flow or pump need the system to actually try and run in order to check that the error has been resolved. When an error occurs a Retry Now button will appear along with a time to retry for. Pressing this button will resume the system momentarily but if the error is still present after the time specified the system will stop

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running again. The time the system will retry for is found on the Settings -> Water System page. When the retry now button is pressed the Action field will be updated to reflected this.

Irrig. Paused	No
Irrig. State	Pump Error 15:24:35 Wed 20 Aug
Action	*Retrying System*

Group Info.

Group Info.	
Act. Groups	All Beds
Act. Stations	Bed 1
Act. Lines	1

When a group becomes active the name giving to the group will appear in this box to indicate that it is running, if the group is unnamed the number of the group will appear. The stations that are active are also displayed in this box as well as the current main lines if installed.

Act. Groups	All Beds, 2
Act. Stations	Bed 1, Bed 3/4
Act. Lines	2, 1

If the system is configured to run multiple groups or stations these will be displayed here separated by a common.

Act. Groups	All Beds
Act. Stations	Bed 1 (Paused)
Act. Lines	

If a system becomes paused the current active stations will be paused the groups are still deemed as active so they can be viewed here even though they are technically not active at present. Any active stations are append with the (Paused) label to indicated that are not running. Since no stations are active the active main lines will be turned of and disappear from the list.

Readings

Readings		
Accum. Solar	21.4J/cm^2	
Capacity	100%	
Flow Rate	**Calc.**	100.00L/min
	Actual	62.37L/min
Accum. Vol	**Calc.**	92L
	Actual	968L

Field	Description
Accum. Solar	Accumulated solar from the systems solar sensor, this is reset at the end of day for the system.
Capacity	Current capacity the system is running out this is derived using the current calculated flow rate of the system and its maximum capacity.
Flow Rate	The current flow rate of the system if a flow meter is installed on the system both the calculated and actual flow rate will be displayed here. If the system does not have a flow meter the reading here will be the calculated flow only.

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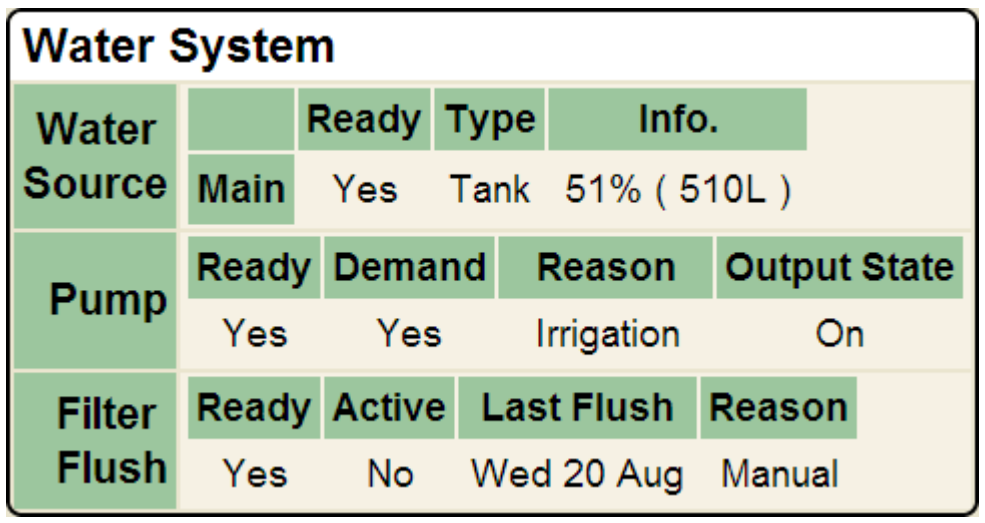
Field	Description
Accum. Vol	The current accumulated volume of the system if a flow meter is installed on the system both the calculated and actual volume will be displayed here. If the system does not have a flow meter the reading here will be the calculated accumulated volume. Both these reading will be reset at the systems end of day.

Water System



Depending on what modules have been installed on the system the information in this box will vary.

Water Source

The "Main" label that is shown in the above screen capture is actually the name given to this water source, this will vary depending on what the name of the source is set to. If no name is given this will appear as simple "Source".

Field	Description
Ready	Is the current configured water source ready. Note a town water supply is always ready.
Type	Type of water source configured.
Info.	If a water source has been configured as a Tank or Batch tank system the current fill level will be displayed here in both percentage and litres. Town water source does not have any relative information so is left blank.

Pump

If a pump has been installed on the system relevant information will be displayed here.

Field	Description
Ready	Is the pump ready to run.
Demand	Is their a demand for the pump to be on, if so the output should be on.
Reason	The reason why the pump is on. If the pump switch is in manual or the system cannot communicate to the pumps output module this will cause an Output Error on the system.
Output State	Current actually state of the output the pump is physically wired into.

Filter Flush

If a filter flush module has been installed on the system the relevant information will be displayed here.

Field	Description
Ready	Is the filter flush ready, this means a flush is not currently active on the system.
Active	Is the system actively flushing the filter currently.
Last Flush	The date of the last completed flush.
Reason	The reason for the latest filter flush.

If a filter flush is currently active an additional field will appear with the time left until it is completed.

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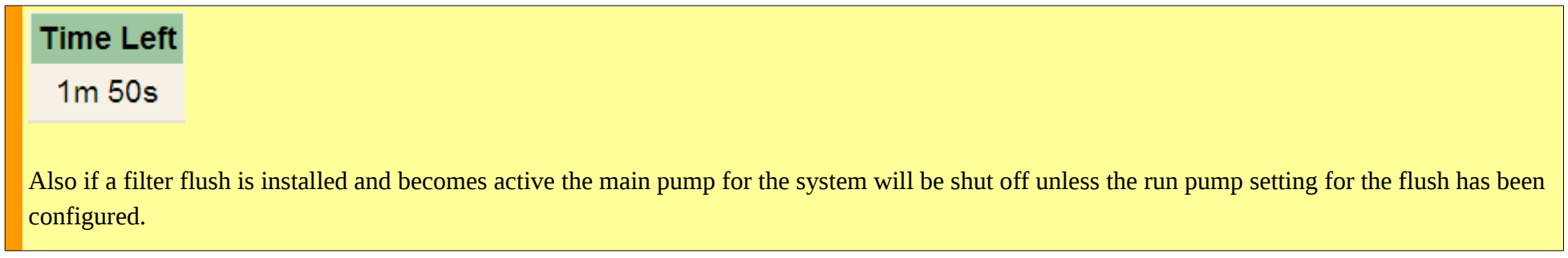


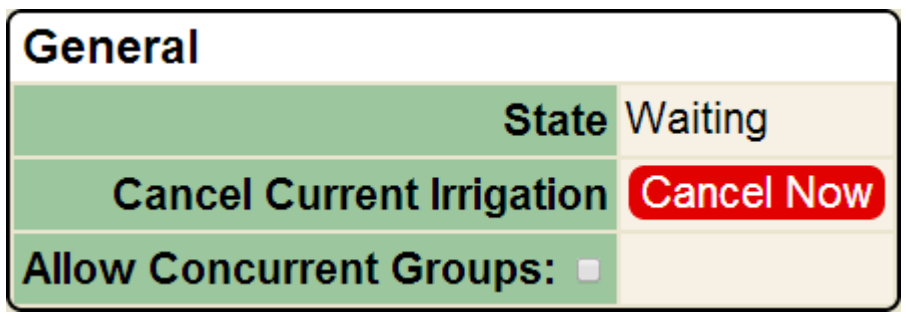
Also if a filter flush is installed and becomes active the main pump for the system will be shut off unless the run pump setting for the flush has been configured.

Groups

A group is a logical collect of stations (Zones) within an irrigation system. These maybe similar plants (Tomatoes, Flowers) Perhaps a where things are physically located (Compartment 1, Outside Crop) or collection of drippers (Bed 1, Bed 2). Each group can have various triggers source such as solar, time of day,. A group can also be manual triggered. In system such as Inline and Batch a Program and Recipe can be assigned to each groups so watering of different groups can have varying Nutrient and pH targets as well as differing recipe mixes.

Settings

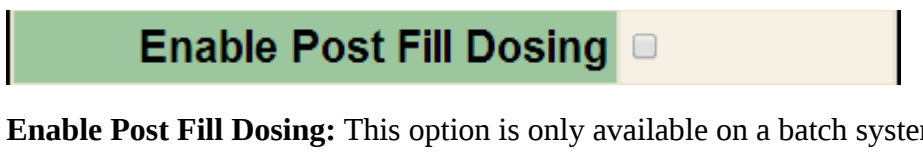
General



State: Current state of the irrigation system

Cancel Current Irrigation: Pressing the cancel now button will immediately cacncel all current active irrigation's. Note that pending irrigation's may start after this.

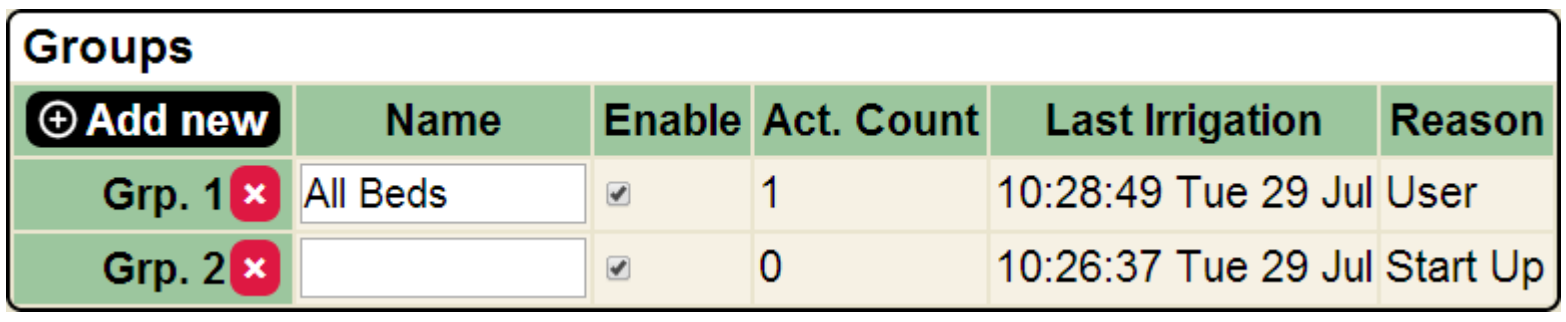
Allow Concurrent Groups: This setting allows more than one group to operate simultaneously on the system. This should only be used if an adequately sized pump has been installed. In the case of inline injection or batch dosing using this setting will mean all groups must run using the same program and recipe as all water is passed through the same dosing system. Ticking the box will reveal a drop down box where the number of groups can be specified. This number is a maximum number of groups that can be on at the same time.



Enable Post Fill Dosing: This option is only available on a batch system, this will enable the batch tank to dose while doing a post fill. This will however restrict the system to a single program and recipe, which will be used for post fill dosing as well as normal dosing when a group is triggered.

Groups

Groups can be added to the system by the use of the add new button in the groups box on the group tab.



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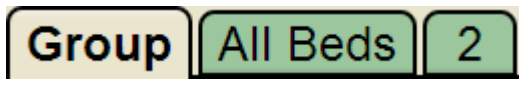
Name: A unique name should be given to each group in order to better identify it within the system this name has no effect on the control. Once a group is added and name it will appear along the tab menu for groups under the name given. Note if the name field is left empty it will be identified using the number of the group.



Enable: This box must be ticked if this group is going to be active. A group might have various triggers configured and needs to be disabled unticking this box will stop the group from running without having to disable the trigger set up on the group.

Act. Count: How many times the group has been active today, this variable is reset at the end of day time.

Last Irrigation: The last time the group was irrigated. Note if the controller is reset all groups will have the same time until triggered. Also if a new group is added the time will be set to the time it was activated.

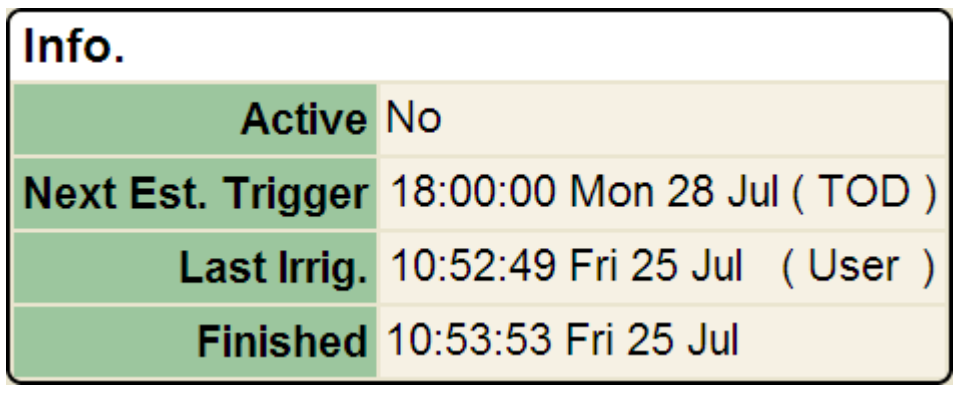
Reason: The reason why the last irrigation happened, this is the trigger cause of the group. Even if the group is cancelled right away this will still be updated. Note that if the system is reset all groups will have start up as the reason. If a group has start up as the reason it has not run since the last time the controller was power cycled. This is also the default reason used when a group is created.

Group

By navigating to the name of the group on the groups tab menu each groups individual settings can be accessed.

Stations

The stations tab is where individual stations can be added to the group a manual action button are also located here as well as general information about the group.



The Info. box contains all relevant information about the group and it's last irrigation.

Active: This variable is used to indicate if this group is currently being water by the system.

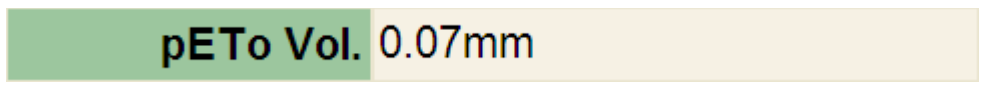
Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

Last Irrig.: The time of the last irrigation trigger for the group and the reason it happened.

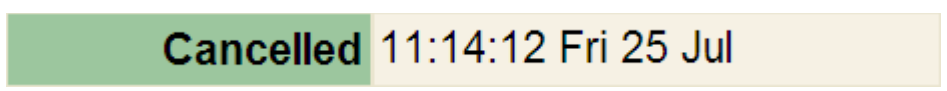
Finished: The time the group finished it last watering.

Additional Information

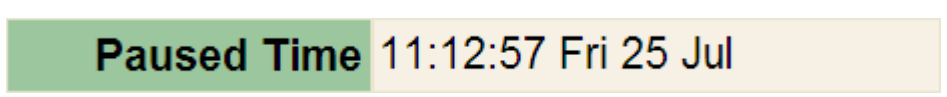
Depending on how the irrigation went or configured triggers the information box can contain additional fields.



If the group has been configured to use pETo triggers the current volume of this will be displayed in the Info. box. Note that pETo triggers are complicated and should not be used without a full understanding of the Evapotranspration model.



If the group was cancelled this reading will be displayed with the time this occurred, since a cancel is a user only event no reason will be given for this.



If a group was paused while it was watering the time at which this happened will be displayed in the Info. box.

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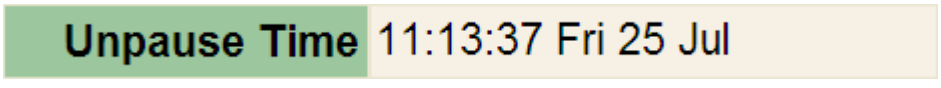
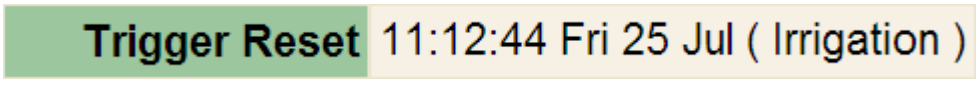


When the group was unpaused the time at which this happened will be displayed in the Info. box.

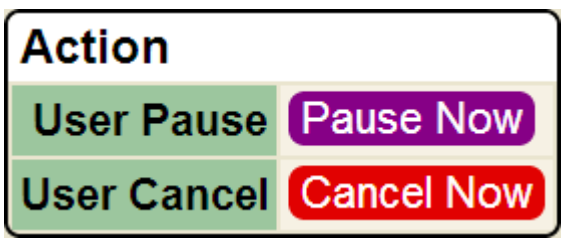


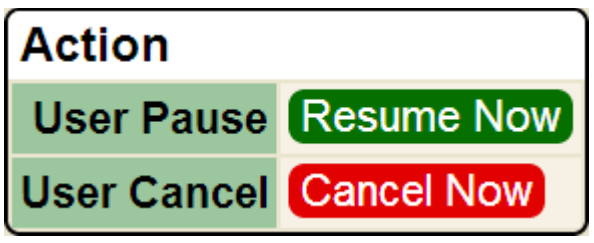
If the group is configured to have periodic triggers the reading which drive these are reset whenever a group is triggered. The reset source can be because the group was irrigated or manual reset. The time at which this happened will be displayed as well as the reason.

Action

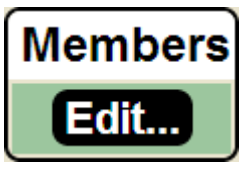
The action box is a quick way to trigger an irrigation on a group from the stations page. Pressing the Irrigate now button will cause an immediate trigger. Note depending on how the system is configured and what may already be running the group may not actually start irrigating straight away, a trigger will however be queued for this group.

Once triggered the action box will change to enable you to either pause/resume a group or cancel this group.

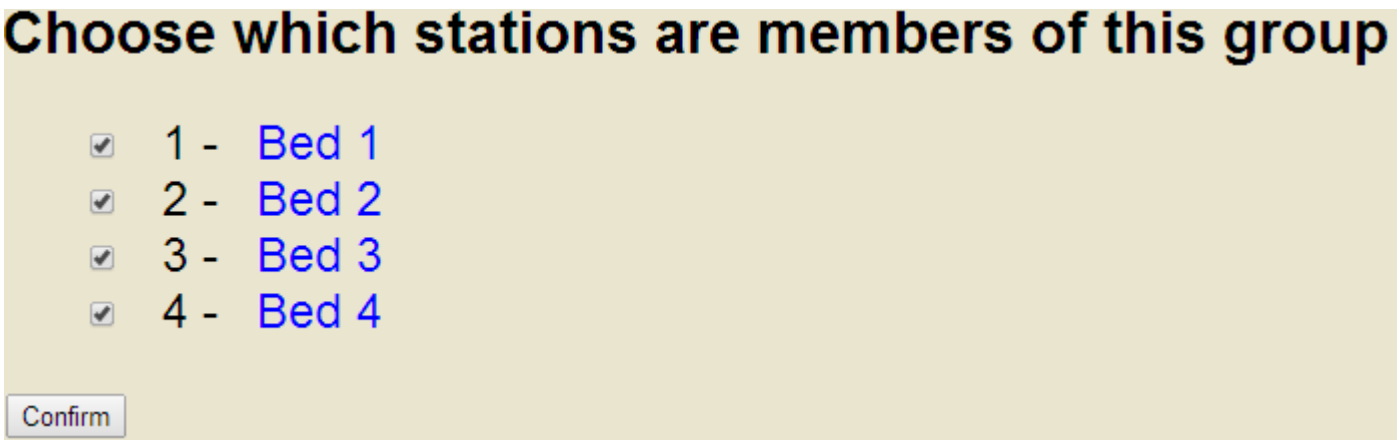




Members

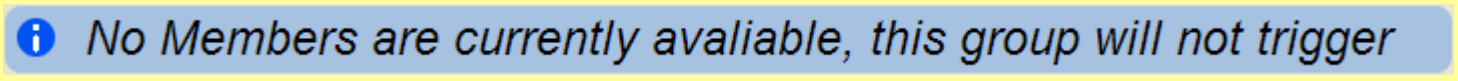


Each group can have up to X amount of members configured. A member is a station (zone) assigned to a group. Pressing the Edit.. button will bring up the members selection page.



Here placing a tick box beside the desired station will add it to this group. The blue field is the name that has been given to the station underneath the configuration page if this is blank the number represents the number of the station. Once all members have been selected press the confirm button to return to the previous page.

If there is no members configured on a group it will not trigger, the follow message will be displayed if this is the case.



Once members have been added to the group and activative this error message will disappear.

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Members

Edit...	Enable	Run Time
Bed 1	☑	01 m 00 s
Bed 2	☑	01 m 00 s
Bed 3	☑	01 m 00 s
Bed 4	☑	01 m 00 s

Enable: Though a stations is added to a group it may need to be disabled for a period of time. Unticking the enable box will stop this group being watered when this group is triggered.

Run Time: The time the stations will be watered for this is set per member per group so each stations run time can be varied simply by the run time specified in the member.

If a station is not enabled under the station configuration page, it cannot be run under any group. It can still be selected as a member but the following box will be displayed.

Bed 4		Disabled in Configuration

The stations must be enabled in order to water this station.

Start Delayed Groups

Members

Edit...	Enable	Start Delay	Run Time
Bed 1	☑	00 m 00 s	01 m 00 s
Bed 2	☑	00 m 00 s	01 m 00 s
Bed 3	☑	00 m 00 s	01 m 00 s
Bed 4	☑	00 m 00 s	01 m 00 s

If group has been setup to ignore the capacity check under the Group->Settings tab then each station will run regardless of if the system capacity is exceeded. This can cause problems if the pump isn't big enough to handle this so a start delay can be used to offset stations to ensure that stations that will run together that will exceed capacity. Note start delays only make sense if multiple stations are being run at once or concurrent groups are running simultaneously.

pETo Run Times

Members

Edit...	Enable	Type	Run Time	Active
Bed 1	☑	Time	01 m 00 s	1m 0s
Bed 2	☑	Volume	01 m 00 s / 1.0mm	0m 7s
Bed 3	☑	Crop Coeff	0.50	0m 3s
Bed 4		Disabled in Configuration		

If a group is set up as a pETo group the run time for each station can be varied based on how much volume of ETo the group has measured.

Enable: The enable setting remains that same as a normal.

Type: Here the type of run time can be specified for each member of the group.

- **Time:** This is a straight forward time and will always run at the station for this length.

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- **Volume:** This will modify the stations run time based of the current pETo volume.
- **Crop Coeff:** The run time will be modified based on the pETo run time specified for the station under the configuration.

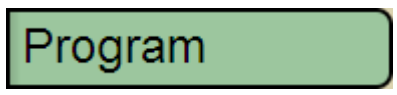
Run Time:

- *Time:* If the Type is configured as a time the run time setting is a simple time.
- *Volume:* The Run Time will be modified based of the current pETo volume being measured. In the example the current run time will be 1 Minute for every 1.0mm volume measured.
- *Crop Coeff:* The crop Coefficient type means that as the crop changes the run time needs to be modified. The pETo run time is consistent so is configured as a stations based setting on the configuration page and the members modify the effect of this. If the stations pETo run time is configured as 1 Minute per 1.0mm and the Crop Coefficient as 0.50 then at actual effective pETo effect is 1 Minute per 2.0mm

If a Coefficeint type run time is going to be used the pETo Stations enable setting on the configuration page must be enabled if this is not the station will be given a run time of 0m00s and this error message will be displayed.

Active: Current run time the station will be assigned if triggered.

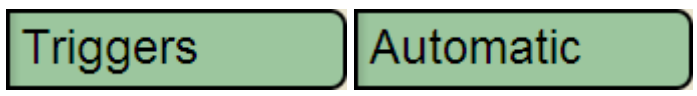
Program



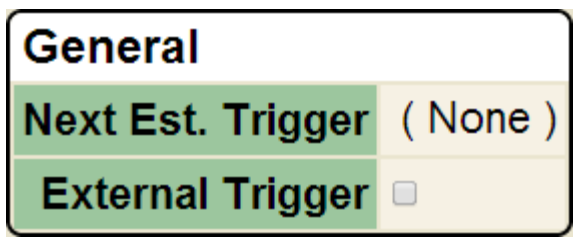
Programs can be individually assigned to each group within an Inline or Batching system, depending on how a system is configured. If the system is an inline system and is set up for concurrent groups a single program is given for the system rather than per group as this doesn't make sense if multiple groups can run simultaneously. This is similar to the post fill dosing option for a batch system where the tank will already be pre-batched with a certain program and recipe so all groups must use the same one. For information about how to configure a program please see the section on Programs later on in the manual.

Triggers / Automatic

The trigger tab will appear as Automatic if the group is configured as manual. Here is where all none periodic triggers are configured.



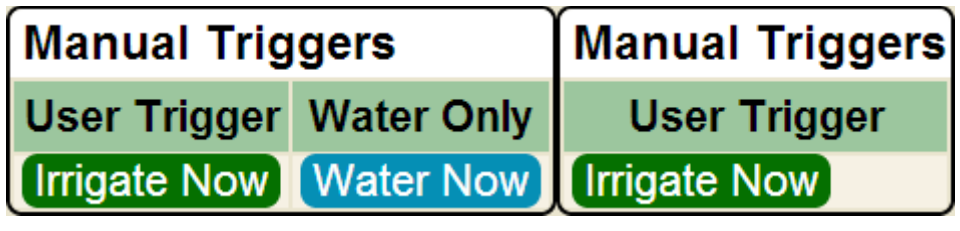
General



Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

External Trigger: An external trigger is a contact closure input wired into an Remote EpM module under the CC input pin or the Moist input on connector B. When this input is pulled the appropriate level by the use of a contact an irrigation is triggered. This can be used with the wall mounted button for example.

Manual Triggers



The action box is a quick way to trigger an irrigation for a group. Pressing the Irrigate now button will cause an immediate trigger. Note depending on how the system is configured and what may already be running the group may not actually start irrigating straight away, a trigger will however be queued for this group. A inline or batching system also has the ability for a water only trigger, pressing the Water Now button has the same effect as a

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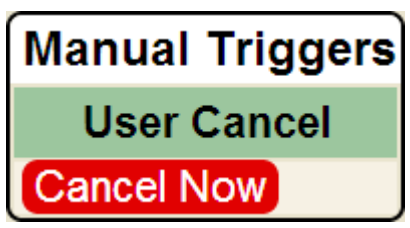
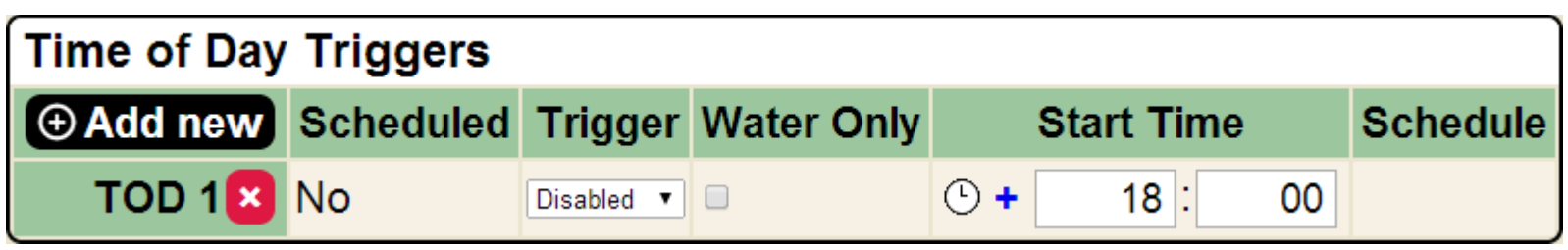
the Irrigate Now except the dosing will be disabled for this group. If the system is a watering system the Irrigate Now button and the Water Now button will result in the same effect so only the Irrigate Now button is viable on this type of system.



Once triggered the action box will change to enable you to either pause/resume a group or cancel this group.

Time of Day Triggers (TOD's)



A Time of day trigger sometimes referred to as TOD is an automatic triggers that will happen at the same time everyday. This will depending on other settings such as days of the week enables and if the trigger is scheduled. Each group can have up to 8 Time of Day triggers.

Scheduled: Is this Time of Day currently scheduled. Note Automatic triggers are always scheduled unless the day of the week is disabled under settings.

Trigger: What kind of trigger this time of day uses.

- ***Disabled:*** Time of day trigger is currently disabled.
- ***Auto:*** Time of day trigger will happen everyday that is allowed to trigger on.
- ***Manual:*** The time of day trigger will only be trigger once then will need to be re-scheduled in order to trigger again.

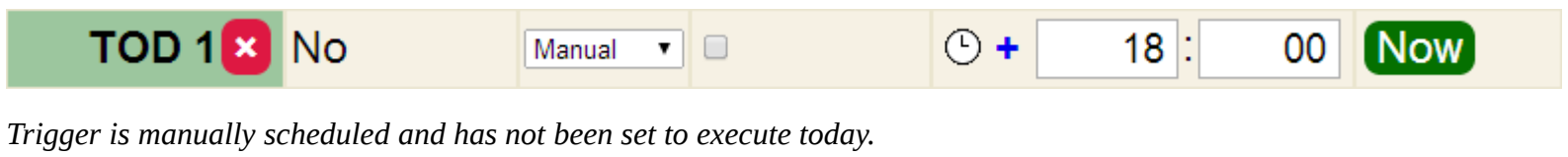
Water Only: The Time of Day trigger will trigger a water only irrigation for the group.

Start Time: The time at which this particular trigger will start at.

Schedule: If a manual Time of day trigger is being used a Now button or Cancel button will appear in this box.

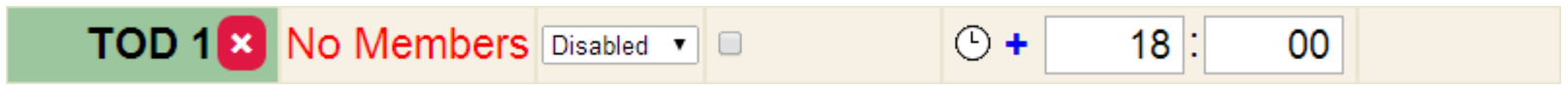
Trigger is automatically scheduled and will be executed as 6pm today.

Trigger is automatically scheduled but will not run today at 6pm because the group is not allowed to trigger today this is shown by the (DOW) next to the No.



Trigger is manually scheduled and has not been set to execute today.

Trigger is manually scheduled and has been set to execute today at 6pm.



The current group does not have any members assigned to it, this means it is unable to trigger and will not execute this trigger.

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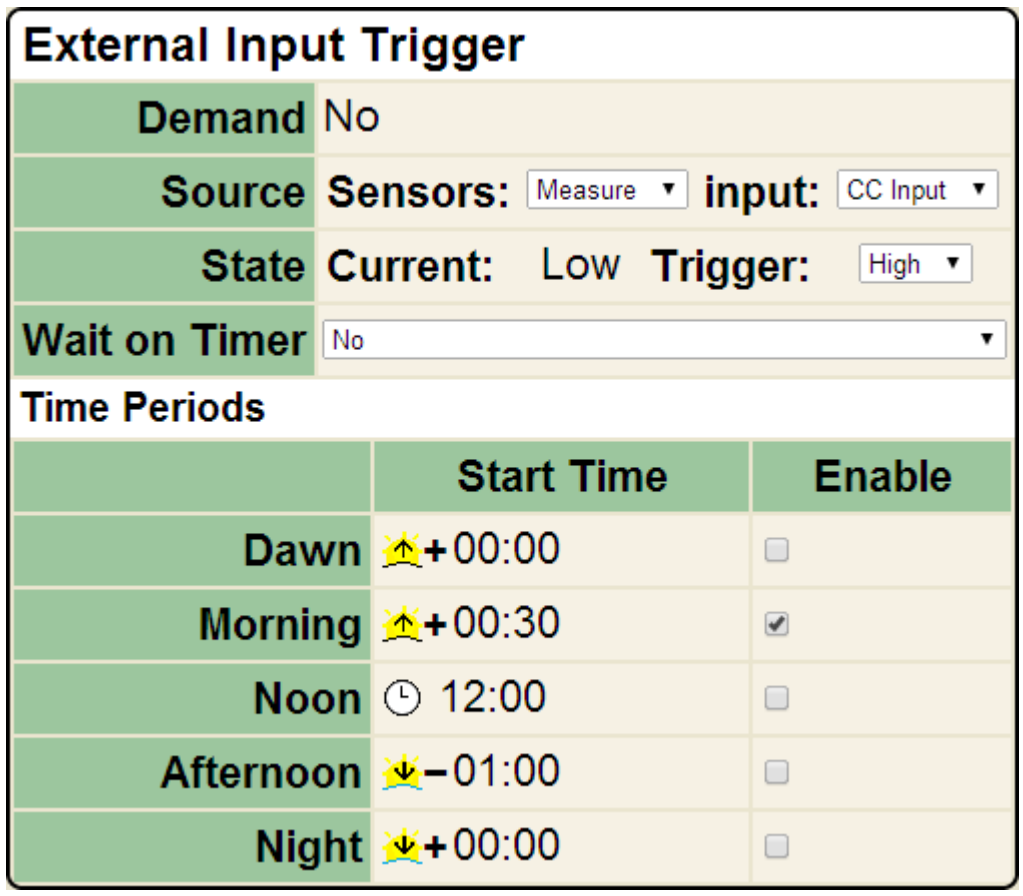
External Input Trigger



Demand: Is an external input trigger demand, once this trigger has been processed this demand will be cleared however the group may not of started irrigating yet. If the trigger is not enabled during this time period the system will

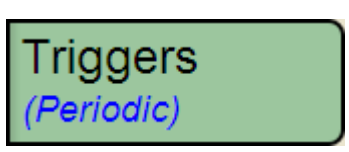
Source: Defines exactly where the input is coming from, this trigger can be activated from any of the three local system sensors. And can be from either the CC input pun or Analog input pin of the device. Note that the appropriate Use Me var must be configured under the sensor setting for the group to ensure that the system

State: List the current state of output as well as the level needed to on the input to action this trigger.

Wait on Timer: If a periodic minimum time out is being used under the group periodic triggers the external input trigger can be configured to obey this. Setting this field to yes means and external trigger cannot be processed until the minimum time out has been reached.

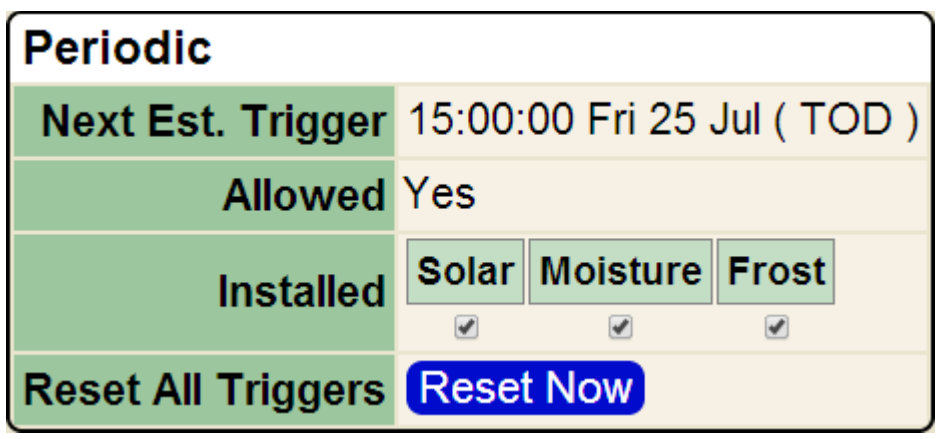
Enable: The trigger can be enabled to only allow triggers within certain time periods.

Periodic Triggers



Each group can have periodic triggers enabled under the settings tab, when this is set an additional tab will be displayed in order to configure them. A periodic trigger is something that is deemed to happen multiple times a day, a certain temperature has been reached, a certain amount of solar has been received.

Periodic


Periodic
Next Est. Trigger 15:00:00 Fri 25 Jul (TOD)
Allowed Yes
Installed Solar Moisture Frost
Reset All Triggers Reset Now

Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

Allowed: Is a periodic trigger allowed, this is controlled by the Minimum timer function of the periodic triggers if this is disabled or the time has

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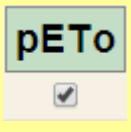
expired this reading will say Yes, otherwise the time remaining will be displayed.

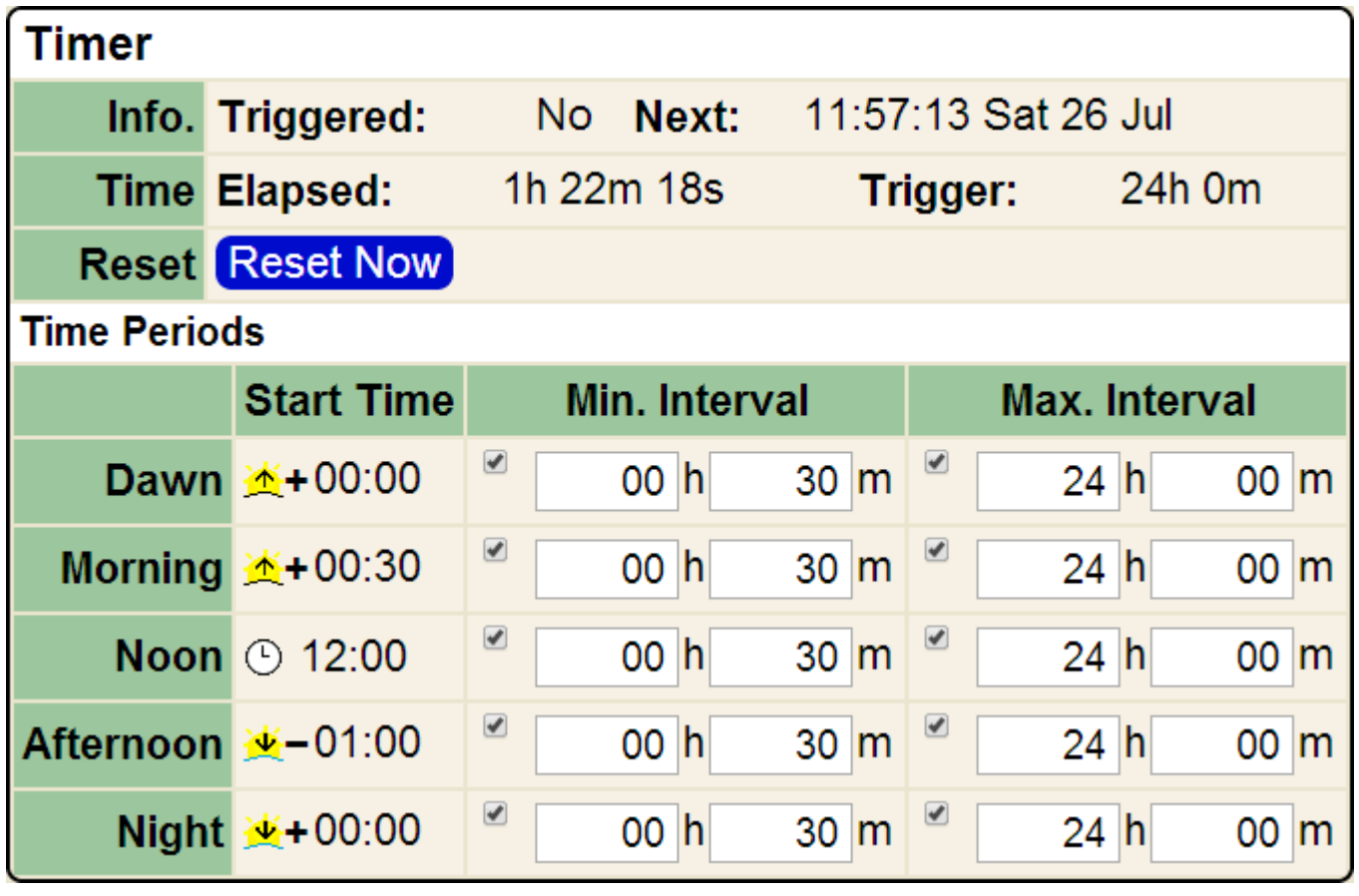
Installed: The Multigrow system supports up to 3 different periodic trigger sources with the option of adding a four if configured in a certain way. Ticking and activating these boxes will reveal separate settings boxes in which each of these can be configured.

A additional periodic trigger can be installed in the system if a pETo group is being used. The additional box shown below will be displayed if this option is available.



Reset All Triggers: Pressing the reset now button will make it seem like a trigger has occurred to the periodic counters installed on the system. This can be useful when delaying but not completely stopping periodic triggers.

Timer


Timer
Info. Triggered: No Next: 11:57:13 Sat 26 Jul
Time Elapsed: 1h 22m 18s Trigger: 24h 0m
Reset Reset Now
Time Periods
Start Time
Min. Interval
Max. Interval
Dawn +00:00 00 h 30 m 24 h 00 m
Morning +00:30 00 h 30 m 24 h 00 m
Noon 12:00 00 h 30 m 24 h 00 m
Afternoon −01:00 00 h 30 m 24 h 00 m
Night +00:00 00 h 30 m 24 h 00 m

The periodic timer lets you specify a minimum time between irrigation as well as a maximum time for each group in the system. Note that if a minimum time is set all other periodic triggers are held off by this. Time of Days and manual triggers ignore this setting.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the Max interval is disabled there will be no next trigger predicted.

Time: Current time that has elapsed since the last trigger for the group. This will be since any trigger not a just a time trigger. Trigger time for the timer, if a max interval timer is disable for the time period this will be left blank.

Reset: Pressing the reset now button will clear the elapsed time back to zero, this will cause the periodic triggers to wait the minimum time again as well as push back the max time out trigger. This is to hold off periodic triggers.

Min. Interval: Each time period has it's own minimum time out settings for greater control. Ticking the Min. Interval tick box will reveal a time box field where the hour and minutes of the minimum interval can be set. Once the elapsed time exceeds this value periodic triggers are allowed to execute.

Max. Interval: Each time period has it's own maximum time out settings for greater control. Ticking the Max. Interval tick box will reveal a time box field where the hour and minutes of the maximum interval can be set. Once the elapsed time exceeds this value a Time Out trigger will be executed.

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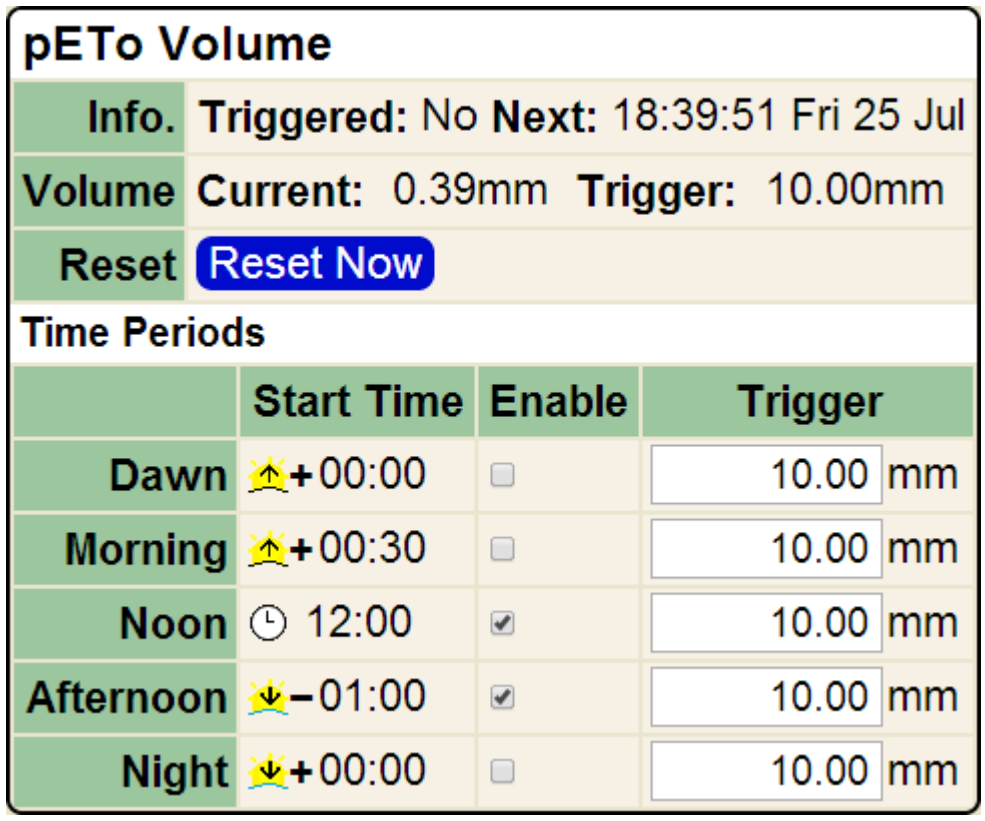
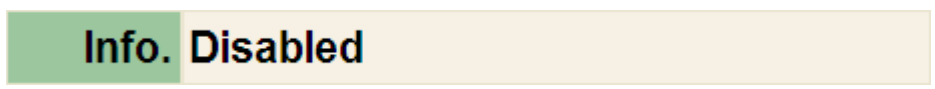
pETo Volume



If a group is configured to use pETo Volume the trigger can be configured here. Each group within the system can have a different pETo trigger. The pETo volume accumulator needs to be properly configured in order for this trigger to work, please refer to the pETo configuration section below for more information on this.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.



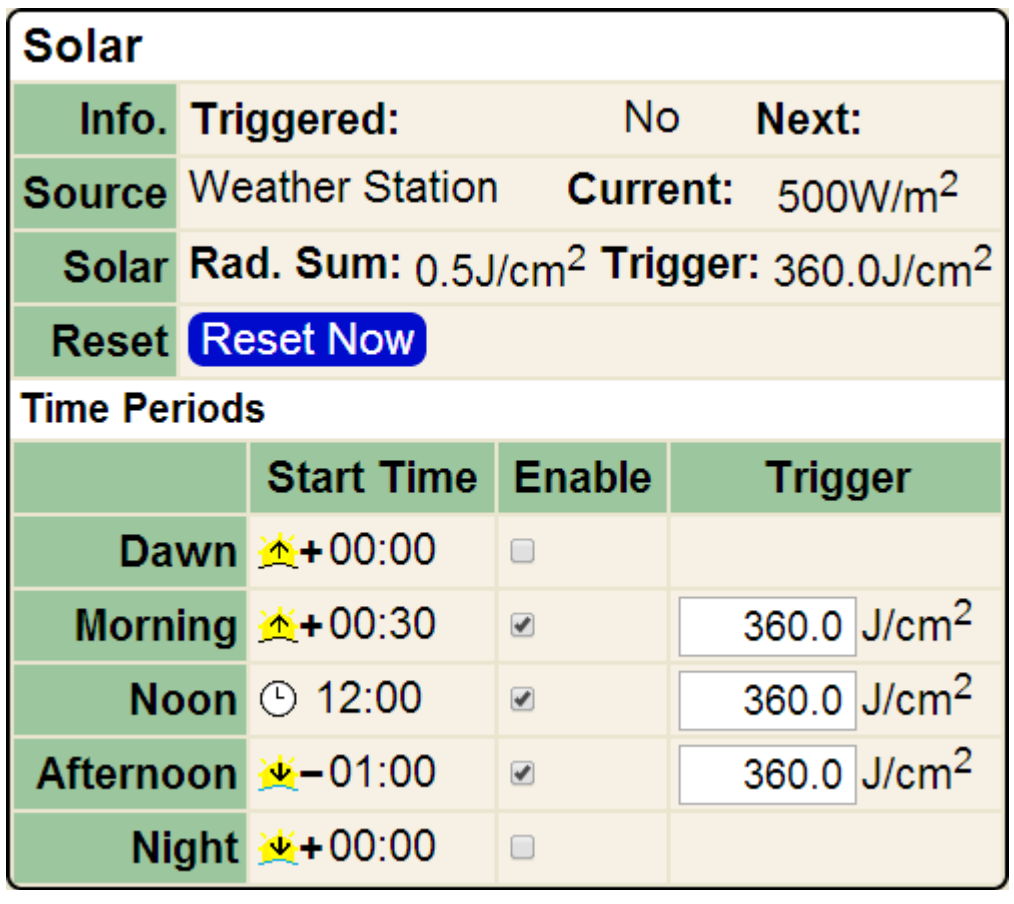
Volume: The current accumulated volume being measured by the group and the current trigger level are displayed here. If the trigger is not enabled the this time period the trigger value will be empty.

Reset: Pressing the reset now button will clear the accumulated volume back to zero.

Enable: Enable a pETo accumulated volume trigger for this time period.

Trigger: Desired trigger level for the time period. Note this value is not visible until the enable is saved.

Solar



A solar trigger lets you specify a accumulated solar level in which the group will be irrigated at, for each group in the system. Note that if a minimum time is set all this triggers will be held off until this time elapses. A valid solar source also needs to be available and configured for the group for this

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trigger to be used. Note the default value for this trigger is 360J/cm^2 this is the average amount of solar radiation accumulated over 1 hour of direct sunlight, during the middle of the day in summer for New Zealand. During winter this number is usually about a third of this 120J/cm^2, or a trigger time of 3 hours instead of 1.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

Source: Current source configured on the group this is set under the settings tab for each group. The current solar radiation value of this source will also be shown here.

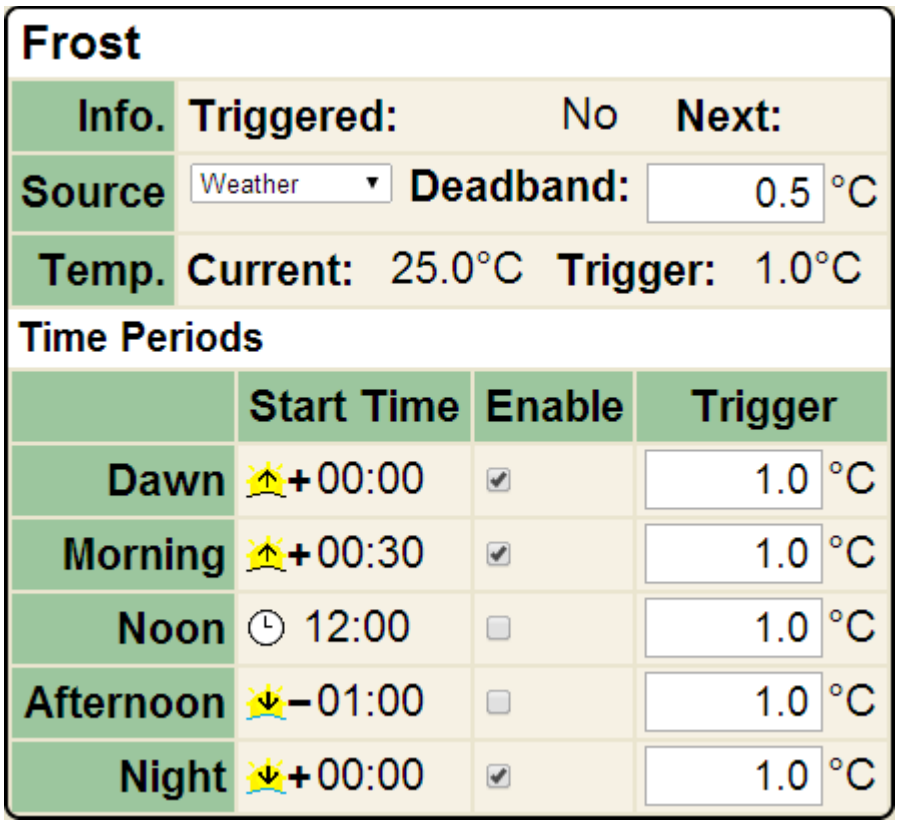
Solar: Current accumulated solar for the group since the last irrigation trigger. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Reset: Pressing the reset now button will clear the accumulated solar back to zero.

Enable: Enable a periodic solar trigger for this time period.

Trigger: Desired trigger level for the time period. Note this value is not visible until the enable is saved.

Frost



During cold times of the year it is possible to configure a group to have a temperature based trigger in order to protect crops from frost. A valid temperature source needs to properly configured for this trigger to operate correctly. It is important to note that while the temperature is below the trigger point an irrigation will be constantly request for this group and will not clear until the temperature rises above the trigger level plus the deadband offset. Because of this it is recommended to use the Min. Interval timer in conjunction with the frost triggers, to insure an appropriate time between irrigation occurs.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

Source: The temperature source this trigger uses as well as the deadband level for the clearing of the trigger.

- ***Weather:*** The frost trigger uses the temperature provided by the weather station.
- ***Independent:*** The frost trigger will use an independent temperature sensor as its source.

Note: If a independent sensor is being used when this option is selected and saved an address box will become visible. The address of the sensor must be entered here. The first box is used to specify the rotary switch address of the device and the second is used to specify whether to use Temperature Probe 1 or 2 (T0 or T1) connected to the device.

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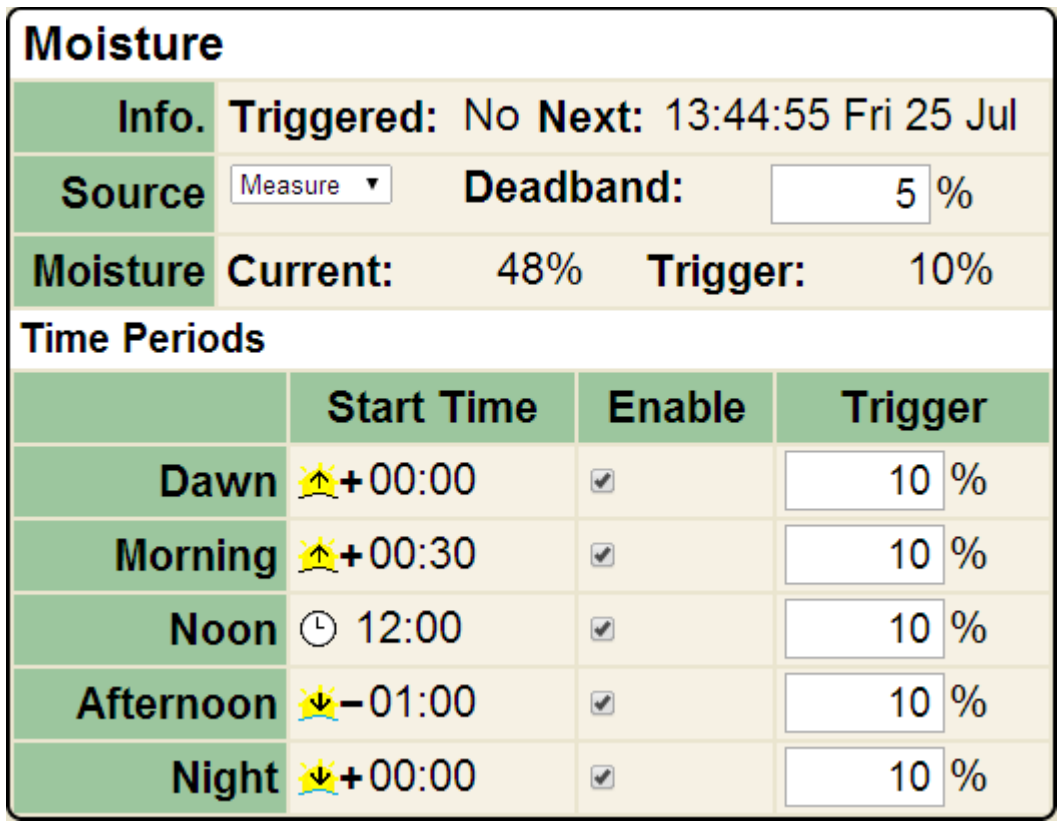
Temp.: Current temperature of the specified source. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Enable: Enable a periodic frost trigger for this time period.

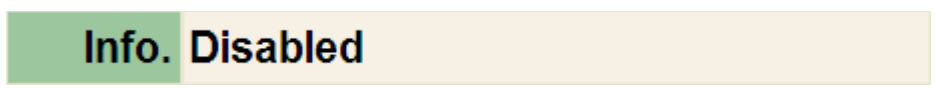
Trigger: Desired trigger level for the time period. This is the minimum temperature before a trigger occurs, the temperature source must drop below this for a trigger to occur. Note this value is not visible until the enable is saved.

Moisture



It is possible to configure a group to trigger based on a moisture level reading from a specific device. A valid moisture source needs to properly configured for this trigger to operate correctly. It is important to note that while the moisture is below the trigger point an irrigation will be constantly request for this group and will not clear until the moisture level rises above the trigger level plus the deadband offset. Because of this it is recommended to use the Min. Interval timer in conjunction with the frost triggers, to insure an appropriate time between irrigation occurs.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.



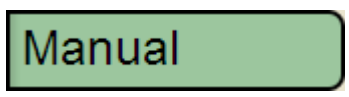
Source: Defines exactly where the moisture input is coming from, this trigger can be activated from any of the three local system sensors. The deadband level for the clearing of the trigger is also set here.

Moisture: Current moisture level of the specified source. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Enable: Enable a periodic moisture trigger for this time period.

Trigger: Desired trigger level for the time period. This is the minimum temperature before a trigger occurs, the temperature source must drop below this for a trigger to occur. Note this value is not visible until the enable is saved.

Manual



It is possible to configure a group to have a manual watering plan. Enabled this option under the settings tab will reveal the manual tab. Here the members of a group can be reorder, missed or individually water. This is useful when dealing with crops with irregular watering cycle, or greater control over individual stations within the system.

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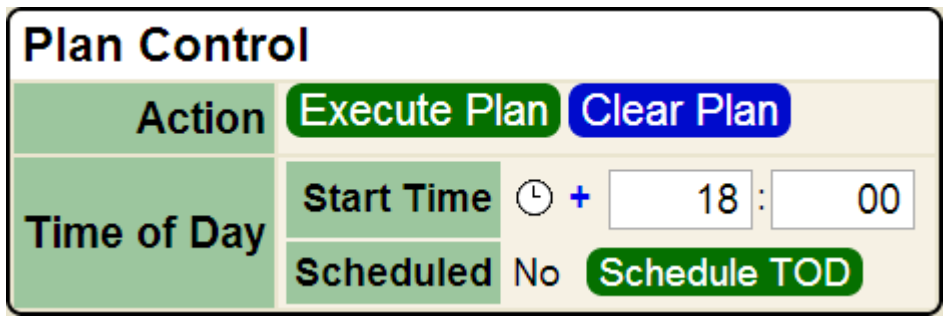
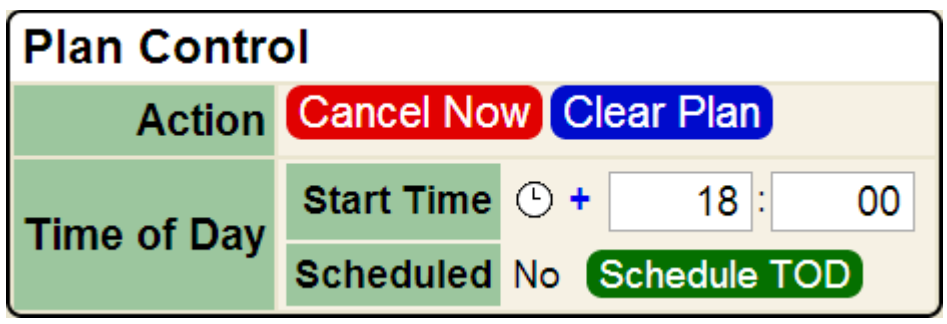
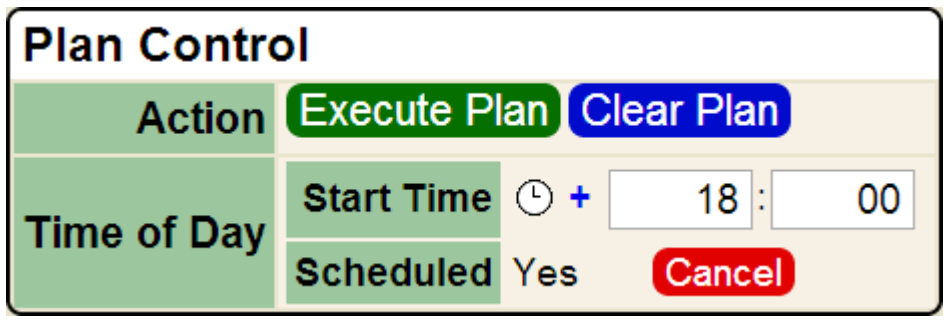
Plan Control

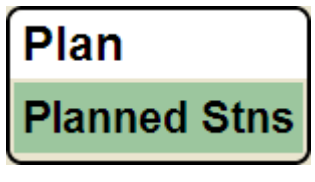


A watering sequence that is manually created is called a Plan, in this box a created plan can be Executed, Cancelled or Cleared. A plan can also be scheduled to run at a certain time of day. This time of day trigger works the same as the manual time of day triggers under the Automatic tab. It will queue a single time of day trigger once this is processed it will then need to be re-scheduled to trigger again (it will not happen automatically). Note that this manually schedule time of day will ignore any days of the week setting than might be configured on the group.

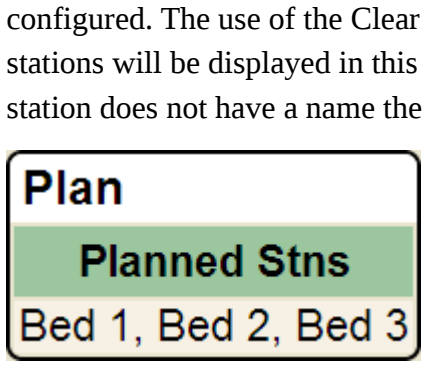




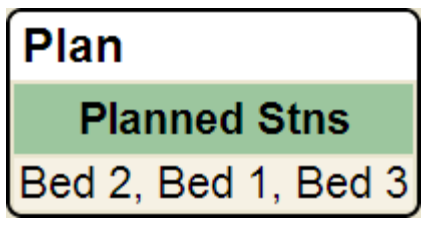
Plan



This holds the current watering plan for the members of the group, once the plan has been watered it will not reset it will stay how is was last configured. The use of the Clear Plan button in the Plan Control settings box must be used to clear the currently configure plan. The name of the stations will be displayed in this list and the order of how they will be watered members can be added out of order from the normal watering plan. If a station does not have a name the station number will be displayed instead.

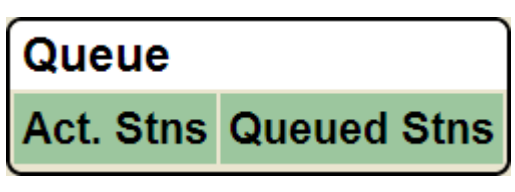


This plan will water Bed 1, Bed 2 then Bed 3.



This plan will water Bed 2 first; then Bed 1, then 3.

Queue



A queue is the current state of the plan being executed. Stations that are active will be shown under the Act. Stns box and stations waiting to be

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executed under the Queued Stns box. If a stations is manually executed while a plan is running it will be added to the end of the Queue.

For example if we are executing the first Plan above.

Queue

Act. Stns	Queued Stns
Bed 1	Bed 2, Bed 3

Bed 1 is currently active with Beds 2 & 3 waiting, after Beds 1 & 2 have run we decide to run Bed 4 manually this will add the stations to the end of the Queue

Queue

Act. Stns	Queued Stns
Bed 3	Bed 4

Members

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Add	Now	Waiting
2	Bed 2	01 m 00 s	Add	Now	Waiting
3	Bed 3	01 m 00 s	Add	Now	Waiting
4	Bed 4				Disabled

Members operate similarly to the stations page, however members cannot be added or removed here. A manual plan can only exist of members already assigned to the group. Here stations can be added/removed from a plan or triggered manual. The state of the station is also shown here. If a station is disabled under the configuration page it will also be **Disabled** here unable actioned.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Now	Planned
3	Bed 3	01 m 00 s	Remove	Now	Planned
4	Bed 4				Disabled

When a member is added to the plan the field will be updated here you can see the plan button has changed from Plan to Remove pressing this button now will take the member out of the current plan. The State has also changed from **Waiting** to **Planned** indicating this member is in the plan.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Cancel	Running
2	Bed 2	01 m 00 s	Remove	Cancel	Queued
3	Bed 3	01 m 00 s	Remove	Cancel	Queued
4	Bed 4				Disabled

When a manual plan is executed the field are updated again. Since the member is already planned for watering it is unable to be individually triggered anymore. However pressing the Cancel button will remove the stations from the queue or stop it from running if it is currently active. Pressing the

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Cancel button will not remove it from the plan, similarly pressing the remove button will only take it the member out of the Plan it will not remove it from the Queue. The state here has changed from **Planned** to **Queued** or to **Running** if the station is active.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Cancel	Running
3	Bed 3	01 m 00 s	Remove	Cancel	Queued
4	Bed 4	01 m 00 s	Add	Now	Waiting

After a stations in the plan has completed it will return back to it's **Planned** state if in the plan or **Waiting** if it was manually triggered.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Now	Planned
3	Bed 3	01 m 00 s	Remove	Cancel	Running
4	Bed 4	01 m 00 s	Add	Cancel	Queued

If a station is not in the plan but manually trigger it will be added to the queue.

pETo Volume

pETo Vol.

pETo Vol. is reading derived from four major environmental readings in order to estimate an approximate Evapotranspiration volume (ETo) for a crop. The Evapotranspiration is a combination of both the evaporation and transpiration of the area it can be useful in determine exactly how much water the plant has lost. The pETo Volume uses accumulated solar, wind speed and vapor pressure deficit (VPD) to estimate the positive volume of the ETo and rainfall to negatively offset it. The option for using pETo Volume is found under the settings tab for a group and must be ticked and applied before this tab is visible.

General

General

Total pETo Volume	0.17mm
Effects	Solar: + 0.14mm Wind: + 0.03mm VPD: + 0.00mm Rain: - 0.00mm
Last Irrigation	11:23:08 Fri 25 Jul
Reset	Reset Now

Total pETo Volume: Total volume measured since the last irrigation. This is the volume that is used to drive pETo triggers under the periodic trigger section of the group.

Effects: A quick overview of the effects each individual reading is currently having on the total volume.

Last Irrigation: Time of the last irrigation for the group.

Reset: Pressing the Reset Now button will clear the pETo volume to 0.00mm

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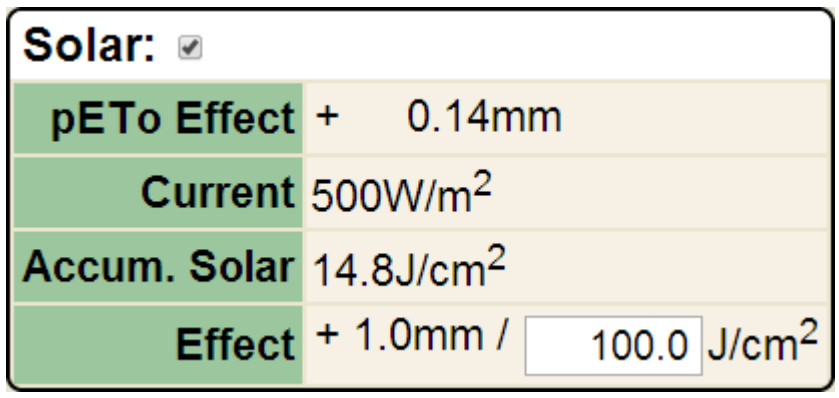
Solar



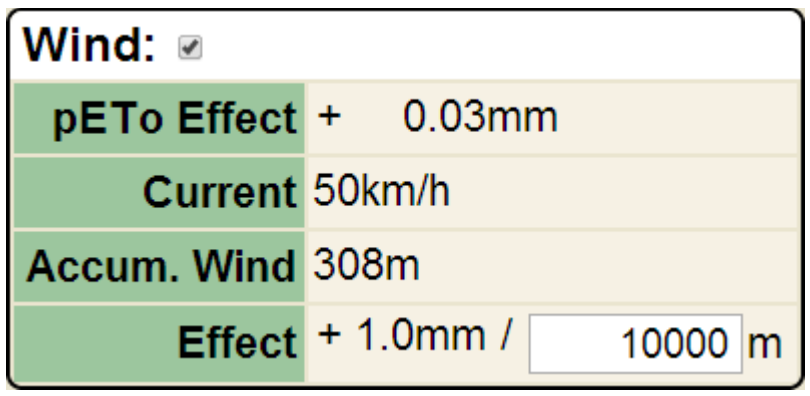
pETo Effect: In order for the solar to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated solar will have.

Current: The current solar being measured. This value is feed from the group solar configured on the settings page.

Accum. Solar: The current accumulated solar radiation since the last irrigation.

Effect: How the accumulated solar will affect the pETo volume. This value is proportional so will be calculated even if the current accumulated volume has not been reached. As you can see above the accumulated radiation is 14.8J/cm^2 with the current setting of 1.00mm / 100.0J/cm^2 this equates to 0.14mm.

Wind



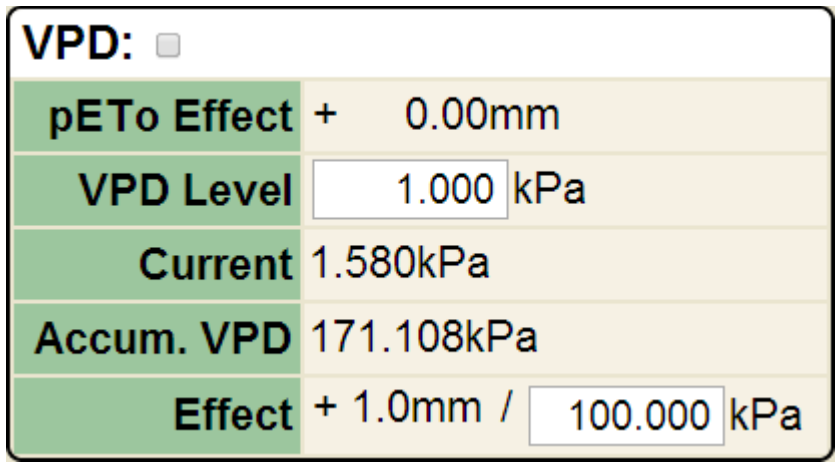
pETo Effect: In order for the wind to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated wind will have.

Current: The current wind being measured. This value is feed from the weather stations and this must be properly configured in order for this to work.

Accum. Wind: The current accumulated wind since the last irrigation.

Effect: How the accumulated wind will affect the pETo volume. This value is proportional so will be calculated even if the current accumulated volume has not been reached. As you can see above the accumulated wind is 308m with the current setting of 1.00mm / 100000m this equates to 0.03mm.

Vapor Pressure Deficit (VPD)



pETo Effect: In order for the VPD to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated VPD will have.

VPD Level: Since the VPD is a constant reading it is only necessary to accumulate it once it has reached a significant level. As the it rises the air can carry more vapor which aids evaporation. Once the VPD reaches the level set here it will being to accumulate in order to give a better representation of how

Current: The current VPD being measured. This value is feed from the weather stations and this must be properly configured in order for this to work.

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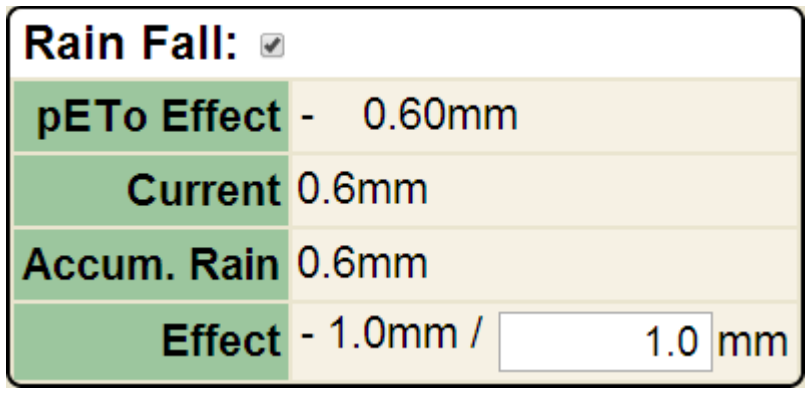
Accum. VPD: The current accumulated VPD since the last irrigation that has been above the set VPD Level.

Effect: How the accumulated VPD will affect the pETo volume.

Rain Fall



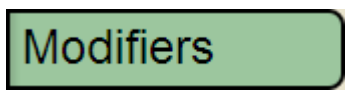
pETo Effect: In order for the rain to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated rain will have.

Current: The current rain fall since midnight. This value is feed from the weather stations and this must be properly configured in order for this to work.

Accum. Rain: The current accumulated rain fall since the last irrigation. Note that the Current is reset at midnight whereas the Accum. Rain is reset on irrigation so it is possible for these values to differ.

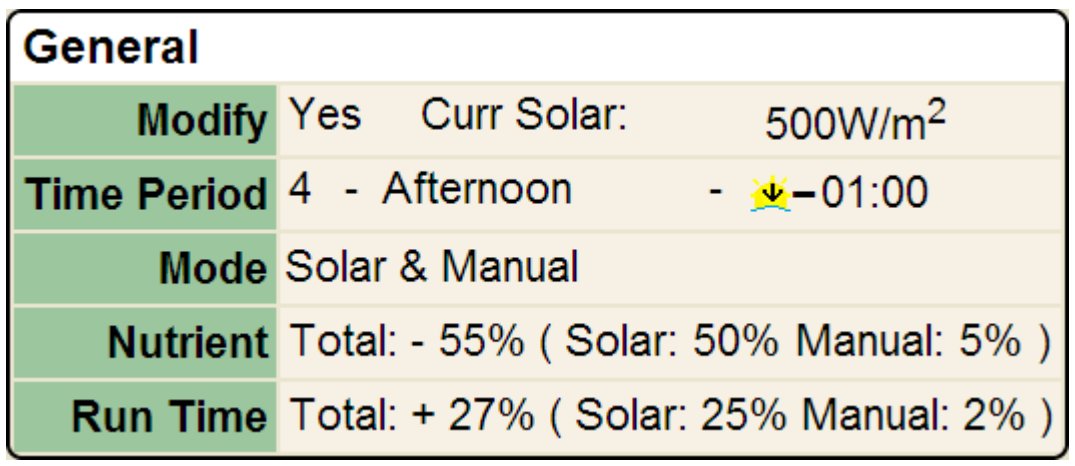
Effect: How the accumulated rain will affect the pETo volume.

Modifiers



Modifiers can be installed in a group to modify the stations run times or nutrient targets if applicable. This option must be enabled on the settings tabs for the group in order to make this tab visible.

General


General
Modify Yes Curr Solar: 500W/m2
Time Period 4 - Afternoon - 01:00
Mode Solar & Manual
Nutrient Total: - 55% (Solar: 50% Manual: 5%)
Run Time Total: + 27% (Solar: 25% Manual: 2%)

Modify: Are modifiers currently needs and the what is the current solar reading this decision is based on.

Time Period: Current active time period, the number, name and start time are listed in this field.

Mode: Current modifier mode configured for this time period.

Nutrient: Total current nutrient modifier and break down of each component. Note if the group is installed on a system with out dosing this modifier will be hidden.

Run Time: Total current stations run time modifier and break down of component.

> Example: If we are trying to irrigate the following group;
> **Group:** Beds 1 & 2
> **Target:** 1.00mS/cm^2
> **Members:**
> * Bed 1 Run Time: 1m00s
> * Bed 2 Run Time: 2m30s
>
> With the current modifiers listed above the resulting settings will be;

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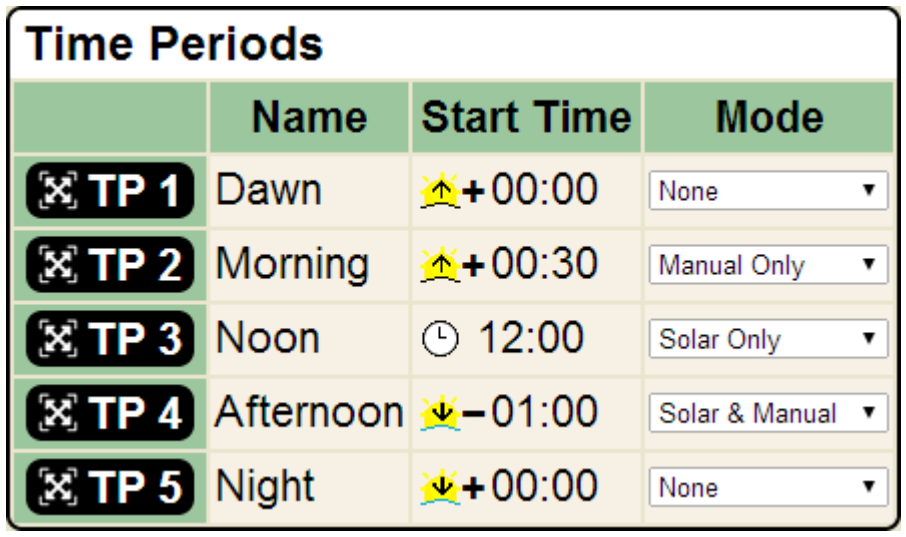
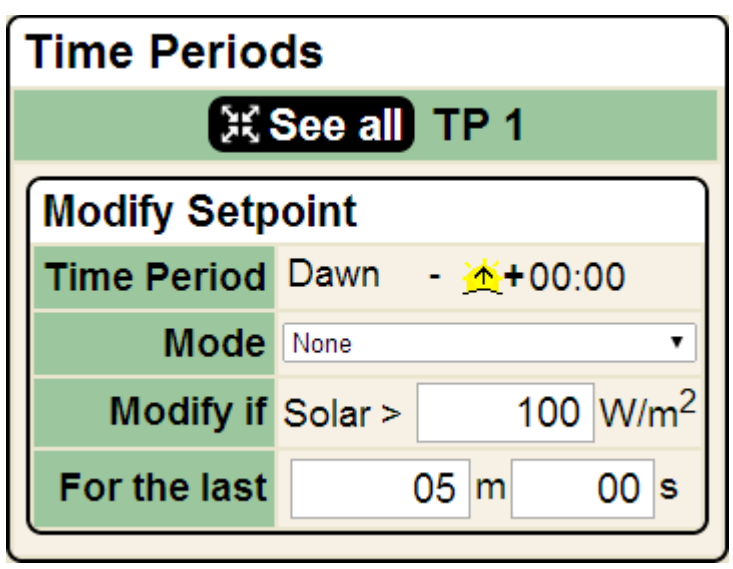
Group: Beds 1 & 2
Target: 0.45mS/cm^2
Members:
* Bed 1 Run Time: 1m16s
* Bed 2 Run Time: 3m10s

Time Periods



Modifiers are time period based settings this is a brief overview of what mode the modifiers are configured for in each one, as well as the name and start time of the particular time period. Pressing the expansion icon on each period will bring up additional modifier settings.

Time Period - Modify Setpoint



On expansion of each time period modifer settings will be displayed. Note that depending on the mode of the time period the information displayed might vary.

Time Period: Current time period name and start time.

Mode: The mode of the modifiers within this time period.

- ***None:*** No modifiers are allowed during this time period.
- ***Manual Only:*** Only manual modifiers are allowed.
- ***Solar Only:*** Only solar modifiers are allowed.
- ***Solar & Manual:*** Both solar and manual modifiers are allowed.

Modify if: This box set the level the solar intensity must reach in order for solar modifiers to be applied. The solar group solar reading is the source this is checked against. This must be properly configured under the group settings tab.

For the last: The solar level must be at this intensity (consistently) for at least this length of time before solar modifiers can be applied.

Modify

The modify box holds the actual modifier settings for the run time and nutrient target of the group. Depending on how the system and time period modify is configure this box may vary in appearance. If the mode has been set to none, this box will not be visible.

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Modify

Modify	Solar					Manual	
Nutrient Target	-	10	% /	100	W/m^2	-	5 %
Station Run Time	+	5	% /	100	W/m^2	+	2 %

The above box contains both nutrient target and run time modifiers as well as both solar and manual modifiers.

Modify: States what variable the modifier will be applied to.

Solar: Current solar modifier, note that in the example a solar intensity of at least 500W/m^2 is needed in order to allow modifiers. Here the Nutrient modifier is set to 10% / 100W/m^2 this mean when the intensity is reached for the desired amount of time, a 50% modifier will be applied. The modifiers are not proportional it will required a further 100W/^{2} before another 10% is added.

Manual: Manual modifiers are always added to the variable regardless of solar level so for the example above the nutrient target will modified by -5% and each stations run time by +2% while the system is in this time period.

Additional Modify layouts

Modify

Modify	Manual	
Nutrient Target	-	0 %
Station Run Time	+	0 %

Manual modifiers only.

Modify

Modify	Solar				
Nutrient Target	-	5	% /	100	W/m^2
Station Run Time	+	2	% /	100	W/m^2

Solar modifiers only.

Modify

Modify	Solar					Manual	
Station Run Time	+	0	% /	100	W/m^2	+	0 %

Solar & Manual modifiers on a none dosing system.

Settings

Settings

The setting tabs contains all the configuration for each group within the system.

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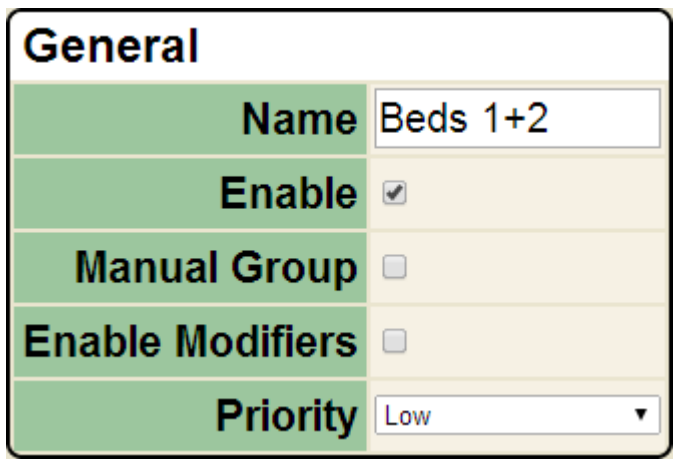
General



Name: Name of the group, this should be keen unique as it is used for identification purposes elsewhere in the system. If this field is left blank the groups number will be used.

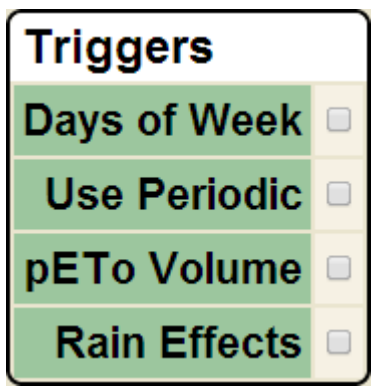
Enable: Where this group is enabled, this is the same setting as the enable on the main group tab. If not ticked this group cannot be triggered.

Manual Group: This will set the group to operate as manual group an additional tab will become available on the left hand side group menu. This will also change the Triggers tab label to Automatic to avoid confusing when configuring.

Enable Modifiers: This will enable modifiers to be used on the group. An additional tab will become available where these can be configured.

Priority: The Multigrow system has two levels of group priorities, setting this to high means that if this group is triggered it will interrupt any low priority running groups. Not a low priority group cannot interrupt a high priority group and a high priority group cannot interrupt another high priority group.

Triggers



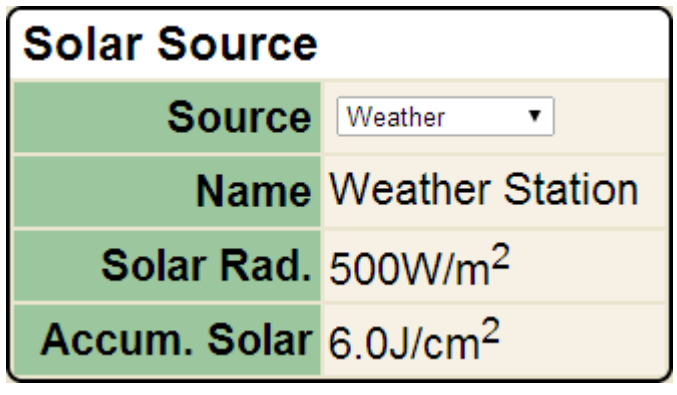
Days of Week: Ticking this box will enable you to select days of the week when this specific group can run. This effect all triggers except for Manual ones.

Use Periodic: If the group is to be triggered from periodic source such as solar, timer, etc. This box must be ticked an additional tab will become available where these triggers can be configured.

pETo Volume: If the group is use pETo triggers, this box must be ticked an additional tab will become available where this can be configured. Also additional options under the periodic triggers to use the pETo volume will become available.

Rain Effects: Does rain effect how this group irrigates.

Solar Source



Each group can have it's own solar source configured, this is to be used in conjunction with the periodic solar trigger as well as solar modifiers.

Source: Source of the solar reading for the group.

- ***System:*** The solar information configured for the irrigation system is also used as this groups solar source.
- ***Compartment:*** A climate compartment solar reading is to be used as the groups solar source.

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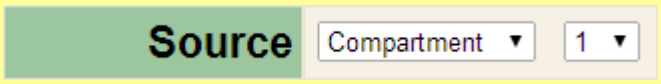
- ***Weather:*** The weather stations is the source of the solar reading this group will use.

If a compartment source is being used an additional setting box will be displayed this must be set to the number of the compartment the desired solar reading is coming from.

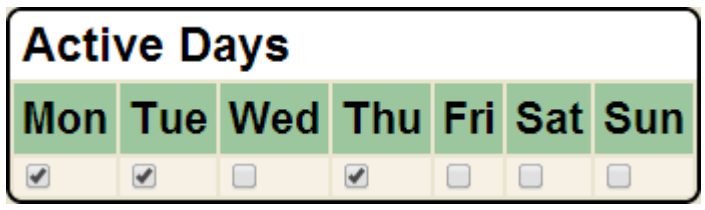


Name: Current name of the solar source, this will either be the name or number of the compartment, the current name or number assigned to the system or weather station.

Solar Rad.: Current solar radiation being reported from the solar source.

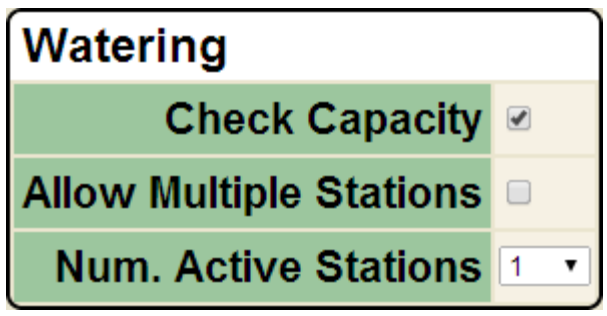
Accum. Solar: Accumulated solar the group has been exposed to since midnight.

Active Days



If the Days of Week tick box is selected under the triggers box this box will be displayed. With in it whatever days of the week the group is allowed to run can be specified. Ticking the box underneath a corresponding day means that the system will be able to run on those days. Note if have selected the Days of Week box but have not specified any days the system will not run. This will effect all automatic and periodic triggers, only manual triggers can be processed on inactive days. In the above example the group can only automatically trigger on Monday, Tuesday and Thursday.

Watering

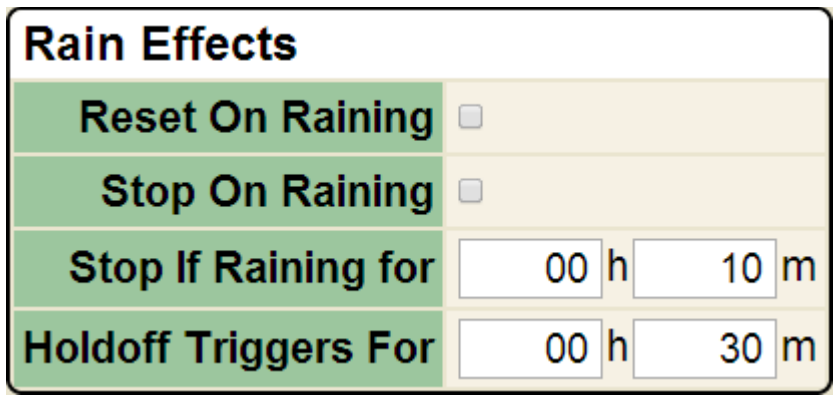


Check Capacity: If a group is set up to ignore capacity a station can run regardless of if there is adequate capacity through the pump. Unticking this box means that careful consideration and manual timing of stations needs to be used when multiple stations and concurrent groups are being used. It is advisable to leave this setting ticked and make sure the system capacity is properly set. If only one group and station is ever going to be run this setting is not really important as the system will always try to run at least one station even if it is over capacity.

Allow Multiple Stations: This will allow the group to run more than one station simultaneously this is useful if the pump capacity can easily provided enough water for multiple stations (zones).

Num. Active Stations: Set the number of stations that can be active at anyone time. The system will try to maintain this as long as the capacity isn't exceeded, unless the check capacity option is disabled.

Rain Effects



Is it possible for some group to contian stations that are directly exposed to rain. If this happens any periodic triggers for the system should reset. Also if the group is currently active and it start to rain the group can be stopped so water is not wasted.

Reset On Raining: Reset any periodic triggers that might be configured on the group.

Stop On Raining: Stop the group if irrigating and rain is detected.

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Stop If Raining for: An irrigation will only be stopped if it has been raining for an X amount time. This setting is only taken into account if the Stop On Raining setting is enabled.

Holdoff Triggers For: If either the Reset on Raining or Stop On Raining settings are enabled and rain is detected, the system will hold of all triggers once it has stop for this time to insure a irrigation is not triggered directly after it has stopped raining.

Info.

The Info. box located on this page is exactly the same as the one on the Stations page for a group, please refer to the Stations section above for more information on this readings box.

Readings

Groups Status

The groups page displays the above information but also changes colours depending on the current groups status the follow states and for are group are described below.

Groups Status

	State	Reason	Act. Count	Info	Last Sum	Rad. Sum	Trigger Level	Total Volume	Station	Action
All Beds	Off	User	1	16:38:35 Tue 19 Aug				55L		Irrigate Now
Grp. 2	Off	User	2	16:33:52 Tue 19 Aug	1.3J/cm^2	7.5J/cm^2	360.0J/cm^2	67L		Irrigate Now

Field	Description
State	Current state of the group
Reason	The last reason an action occurred on a group.
Act. Count	The amount of times the group has been active today.
Info	This will display the time when the group last changed state. If the group is active the Estimated Time remaining for its irrigation will also be displayed in this field.
Last Sum	If a group has solar triggers configured every time the group is triggered the current accumulated solar sum is recorded even if the trigger source was not a solar trigger.
Rad. Sum	The current level of the groups solar accumulator.
Trigger Level	The current trigger level of the group this will be displayed as XXJ/cm^2 if the trigger is displayed for the current time period.
Total Volume	The total volume the group has passed since midnight, this is based on the stations within the groups flow rates.
Station	When a group is active the current stations being irrigated will be displayed here along with their run times and the option to skip. If the group is set up to run multiple stations at once all active station will be displayed here.
Action	This field holds the User Action buttons for a group depending on the current state of the group the buttons displayed here will vary.

If a system is configured as inline an additional field will be present for every group called Correction Factors. Here the current corerection factors for both the nutrinet and pH dosing modules are displayed.

Correction Factors
Nutrient: 100% pH: 100%

Disabled

Disabled	Solar	8	10:42:21 Wed 20 Aug	9.1J/cm^2	0.6J/cm^2	9.0J/cm^2	1890L		

If a group is disabled on the Settings -> Groups main overview the group will become grey, this will also remove any action buttons from the group. A disabled group cannot be trigger by any means even manually it must be enabled first. If the solar trigger was is enabled on a disabled group all the relative solar information will still be displayed and the Rad. Sum will still be accumulated by the group.

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Off

Off	Time Out	5	10:19:31 Wed 20 Aug	3.6J/cm^2	8.3J/cm^2	9.0J/cm^2	1575L		Irrigate Now

When a group is inactive all relative information for the group is displayed, the only valid action from an off group is to manually Irrigate Now. The reason and info listed in an off group are the information from the last irrigation for the group.

Pending

Pending	User	6	10:30:35 Wed 20 Aug	0.7J/cm^2	0.7J/cm^2	9.0J/cm^2	1587L		Clear Pending

If a group is triggered by cannot run yet because maximum number of groups or system capacity has been reached the group will become pending. WHen this occurs the group will turn a light blue to indicate this, when a group is pending it can be manually cleared by pressing the Clear Pending button now visible in the action field.

Pending (Batch System)

Pending Filling	User	0	16:32:10 Tue 19 Aug	16.9J/cm^2	17.0J/cm^2	360.0J/cm^2	0L		Clear Pending

When a group is trigger on a batch system the group must wait for the batch tank to be ready, this makes the group enter the pending state but being held off by the batching module. The group will turn a blueish colour to indicated this, the current state of the batching module will also be displayed in black underneath the Pending state message. Like a normal pending group these groups can also be cleared, note that if this happens the batching system will continue to run until a stable state is achieved. If the group is cleared the batch system will stop dosing but will continue to fill or complete a stir cycle if that was the operation it was doing, the tank will most likely be left in a waiting full state if this sequence occurs.

On

On	User	2	16:33:51 Tue 19 Aug ETR: 0h 0m 47s	1.3J/cm^2	0.1J/cm^2	360.0J/cm^2	35L		Name	Time Remaining	Skip	Pause Now
								Stn 1	Bed 1	0m 56s	Skip Now	Cancel Now

When a group becomes active it will turn green to indicated this, the state will also be updated to On. When a group becomes active the info box will be updated with the time of the trigger plus display the estimated time remaining for the group. Since a group has no knowledge of when it maybe interrupted or held of because of flow the time is only an estimate. The station field will also be populated with the active stations within the group. While a group is active the action button changes to Pause Now and Cancel Now these are the two valid options.

On (Multiple Stations)

On	User	9	10:45:19 Wed 20 Aug ETR: 0h 10m 25s	2.1J/cm^2	0.4J/cm^2	9.0J/cm^2	1913L		Name	Time Remaining	Skip	Pause Now
								Stn 1	Bed 1	9m 35s	Skip Now	Cancel Now
								Stn 2	Bed 2	0m 35s	Skip Now	

If a group has been setup to use multiple stations it will operate exactly the same as a single stations group. The stations field will just contain more enters for the number of stations the group is allowed to run. If the group does not or cannot run the maximum number of stations as allowed field will still be displayed.

	Name	Time Remaining	Skip
Stn 1	Bed 1	8m 41s	Skip Now
Stn 2		0m 0s	Skip Now

On (Pending)

On (Pending)	Time Out (Time of Day (Auto))	4	16:47:49 Tue 19 Aug ETR: 0h 5m 13s	0.8J/cm^2	3.9J/cm^2	9.0J/cm^2	280L		Name	Time Remaining	Skip	Pause Now
								Stn 1	Bed 1	5m 24s	Skip Now	Cancel Now
												Clear Now

A group may take a long time to finish a single irrigation cycle of all the groups configured. It is possible that since the time the group has started a new trigger has been requested for the group even though it is still active. If this happens the new trigger will be queued (Pending) until the group has finished running, once the group has finished irrigating it will then process the pending trigger and the group will start running again. In this state the

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(Pending) will appear under the on label, the reason for the pending trigger will also be displayed under the current active reason. The action field will also contain three buttons; Pause will pause the current active irrigating, Cancel will can the current active group (Note that the pending trigger will be processed once the group is cancelled) and Clear which will clear the pending trigger but not effect the current irrigation (Note a pending trigger cannot be cleared when a group is paused it must be resumed first).

If a second group has been pending before the first group generates a pending trigger the secondary group will become active before the current group is allowed to restart again.

Paused

Group Pause

Paused	User	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	5.8J/cm^2	9.0J/cm^2	312L		Name	Time Remaining	Skip	Resume Now
								Stn 1	Bed 1	4m 13s	Skip Now	Cancel Now

Once a group is running the Pause Now button becomes available pressing this will stop the current irrigation for that group and hold its current progression. This can allow another group to run or to fix a problem within an active group without having to restart the group. In this state the group will turn a light purple colour, the reason will become User and the stations within the group will be appended with (Paused). In this state the group can be resumed or cancelled using the appropriate buttons, Note if other groups are pending they will immediately start running once the active group is paused.

System Pause

Paused	Pump Error	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	7.0J/cm^2	9.0J/cm^2	322L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	8m 57s	Skip Now	

When a system pause occurs on with the irrigation system all active groups on the system will be paused it will also stop any additional groups from being triggered. When a system pause occurs the reason will be overwritten with the pause reason of system and the group will become a light purple colour.

System Pause (User)

Paused	System Pause	12	11:46:25 Wed 20 Aug ETR: 0h 11m 2s	3.3J/cm^2	3.3J/cm^2	9.0J/cm^2	2298L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	8m 34s	Skip Now	

A whole irrigation system can be manually paused on the Readings -> Status page this will cause all active groups to groups on the system to be paused. This will cause the group to change to light purple colour and update the reason of the group to system pause to indicate that this has happened. This differs from a group pause because no other groups on the system can run or be resumed only by resuming the whole system will groups become active again. It is possible however to cancel a paused group in this condition.

Interrupted

Interrupted	User	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	9.7J/cm^2	9.0J/cm^2	345L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	9m 9s	Skip Now	

It is possible for a group to be set up as a high priority group, if a high priority groups becomes active while a low priority group is irrigating the low priority group will be interrupted. When this happens the low priority group is paused until the high priority group has finished running. A group will only be interrupt if either the max number of active groups has been reached or the system capacity will be exceeded otherwise both groups will run concurrently. If a group is interrupt it will turn light purple the reason will also change to User.

Stations

A Station or zone is used to logically separate watering valves within a system. One Multi controller can support up to 300 different Stations or Zones.

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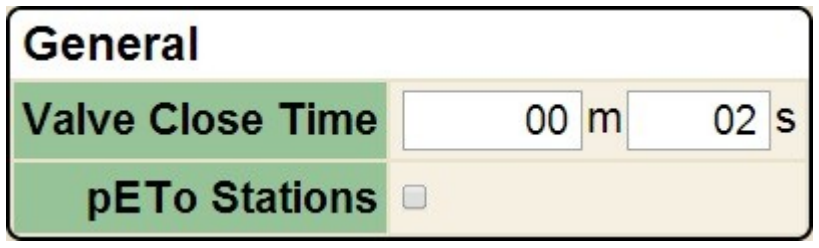
Configuration

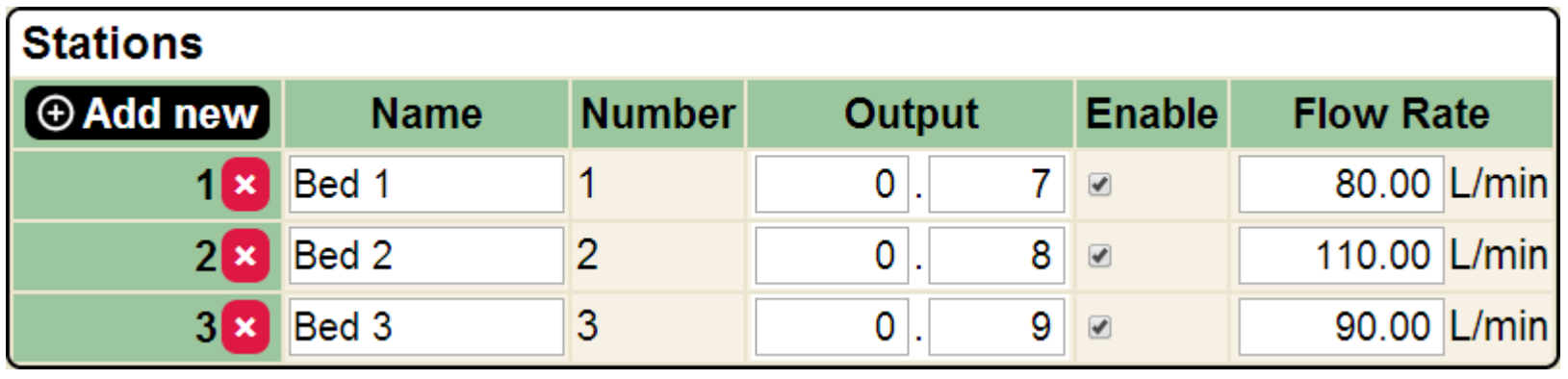
General



Valve Close Time: Most valves require a certain amount of pressure in order to close correctly. This means the pump must be running but the station output itself must be off. This is the time need in order to this to happen.

pETo: pETo is an advanced controlling methodology based around the Evapotranspiration model of plants. This is a very complex control method that should only be used if a full understanding of those this model works. This option is only available on In line and Batched systems.

Stations



Name: This is a unique name given to a specific station within the system. The name itself has no effect on control but is useful for identification elsewhere in the system. It is also used for alerting.

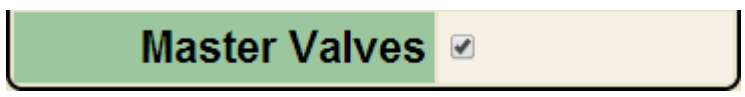
Number: This is an index generated by the system for the corresponding stations it will be used for identification if the name is left blank.

Output: This is the physical output this station is wired. Please refer to section 3.0 Outputs for information about this field.

Enable: A global enable for the station, if a station to be used in watering this must be ticked. Un-ticking it will make this station unable to be watered by the system. This can be useful if this station has becoming faulty it can be disabled globally in one place.

Flow Rate: In order for the system to acknowledge there is a problem with a station, the flow throughput of the station must be known to the system. Once this station becomes active the system will expect the flow rate to be at a certain level based on this setting. Seeing too big of a variation in this reading the system can determine if a problem has occurred.

Master Valve: If master valve are configured on the system, stations can be assigned to use them. Match the number in this drop down box to a Line Number of a particular master valve, in order to turn this valve on when this station becomes active. If this is left blank no master valves will be switched on when this station is running.



pETo Run Rate: If the pETo Stations has been ticked this option will be available. A pETo run rate can be specified for each station the use of this run rate is specified later under the groups setting page.

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pETo Stations	☑

pETo Run Rate				
01	m	00	s	/ 1.0mm
01	m	30	s	/ 1.0mm
00	m	30	s	/ 1.0mm

Readings

Stations

	Enabled	Act. Count	Accum. Vol.	Output State	Switch Pos.	Fuse
Bed 1	Yes	1	32L	Off	Auto	OK
Bed 2	Yes	1	46L	Off	Auto	OK
Bed 3	Yes	1	36L	Off	Auto	OK
Bed 4	Yes	1	28L	On	Auto	OK

Enabled: This reading relates to whether a stations is enabled or not on the system, this is set using the enabled configuration option for the station. If the station is not enabled here it will not be able to be watered by any group.

Act. Count: Current times the stations has been active today, this includes manual operations. Note when counting manual operations the time the satiation is on is not taking into account simply that it has become active. Even if this is only switched on the off for a small interval this count will increase.

Volume: If a flow meter has been installed in the system an this column will visible this holds the current volume for a station. If the station is not active this will be the volume passed through the station during the last irrigation. When a new irrigation starts on this station this value is reset and starts accumulating again.

Accum. Vol.: Current volume the station has passed today, this is reset at the systems end of day.

Outputs State: Current state of the output.

Switch Pos.: Current switch position of the assigned output.

Fuse: Current state of the fuse for the assigned output.

Water System

Configuration

General

General

System Capacity	100.00 L/min
Main Pump: ☑	1 . 1

System Capacity: This setting is important for irrigation systems. It specifies the water throughput capability of the system, this is used to determine if multiple stations or multiple groups can run. It can also be used in certain aspects of dosing.

Main Pump: Ticking the main pump box will display the output assignment box for the pump. A main pump is the pump used for irrigation of the zones, in some cases this can also be used to stir the batch tank.

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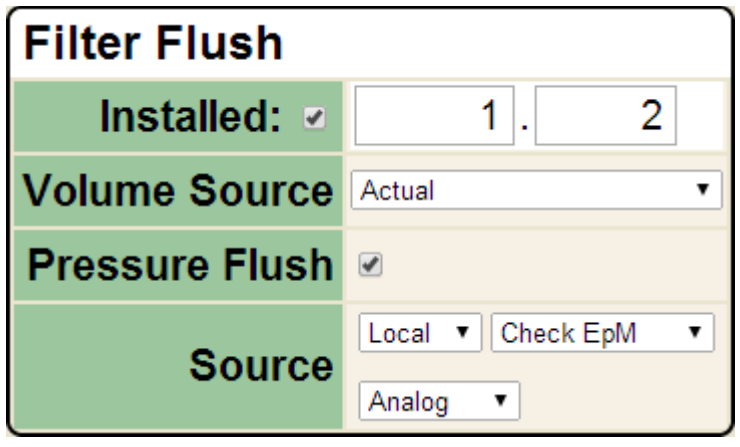
Filter Flush



Installed: If the irrigation system has a filter installed it is usually recommended to flush this periodically. Ticking this box will enable an output to be assigned to the filter flush. When flushing this output will becoming active.

Volume Source: It is possible to select the filter flush on volume to look at either the actual or calculate volumes used on the system.

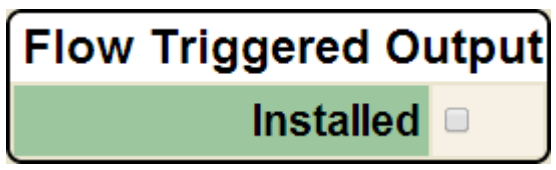
- ***Calculated:*** The filter flush will use the calculated volume reading in order to trigger a filter flush. Note that the calculated volume is derived from the flow rate set under each station with in a system, these values must be correctly enter for accurate results.
- ***Actual:*** The filter flush will use the actual volume reading to trigger. Note that this value is derived using the actual flow supplied by the Measured EpM sensors. A flow meter must be properly configured on the system in order to use this volume correctly.

Pressure Flush: A filter flush can be triggerd from a pressure sensor. A pressure sensor is used to detect when the filter has become to blocked and needs to be flushed.

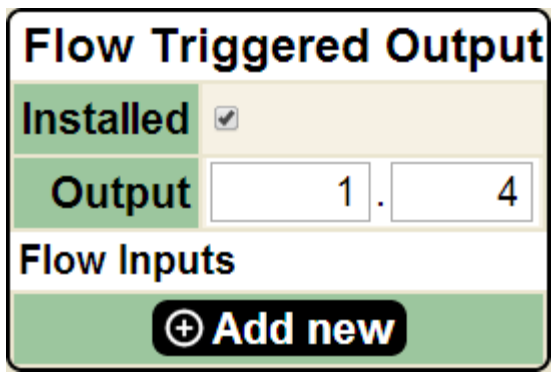
Source: The input where the pressure sensor is physically wired in to. This can be Main or Local EpM sensors CC or Analog (Moist) input.

Flow Triggered Output

A flow triggered output is a general purpose output that can be configured to turn on when flow is detected from any number of sensor sources. Flow levels can be adjusted to make sure the output will only turn on when a certain amount of flow has been detected.



Installed: Ticking this box will install a flow triggered output onto the irrigation system. Once ticked the output configuration options will be displayed.



Output: Address of output that will be driven on when flow is detected.

Flow Inputs

Any number of flow inputs can be added to the system. Once added each one needs to be configured.

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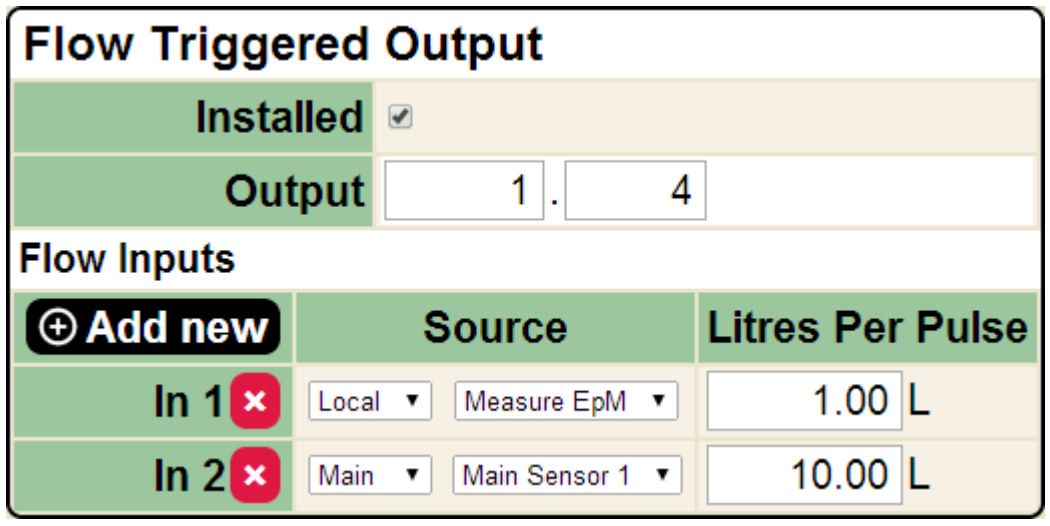
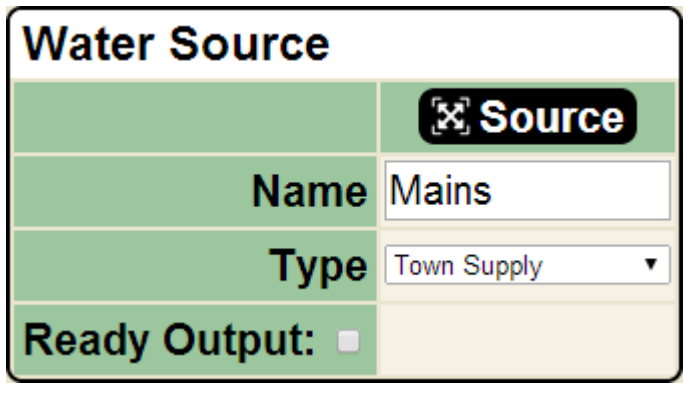


Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
  - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
  - ***Check:*** Flow source is the Check Remote EpM sensor group.
  - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
  - ***Main Sensor 1:*** Flow source is from Main Sensor 1.
  - ***Main Sensor 2:*** Flow source is from Main Sensor 2.
  - ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: Here the flow rate of the desired source is specified, this value should be specified by the manufacturer of the flow meter.

Water Source

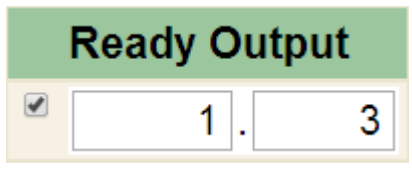


Name: This is a unique name given to the water source useful for identification elsewhere in the system. It is also used for alerting.

Type: Type of water source being used on the system. This can vary depending on individual requirements of the system.

- ***Mains:*** Irrigation system is connected directly to a main water supply.
- ***Tank:*** The irrigation system is feed from a tank. Note this is not the same as a batch tank. If the batch tanks fill input is on the output of another tank then this option should be selected.
- ***Blend Tank:*** This is the same as a normal tank except with the added ability for blending two different fill inputs in order to try and pre-blend the nutrient level of the tank.
- ***Main Tank 1, 2 & 3:*** Main Tanks are identical to normal system tanks but are configured at the site level. This is useful if one tank is to be used across multiple irrigation systems. These are configured outside of an irrigation system, since they are used across multiple systems.

Ready Output: A water source such as a tank may only be ready when it is a certain percentage full, if a ready output is installed this will turn on once the water system has determined it is ready. Note a Town Water source is always ready.



Additional Configuration

Pressing the source button at the top of the box will display additional configuration's for the water source depending on which type of source has been selected.

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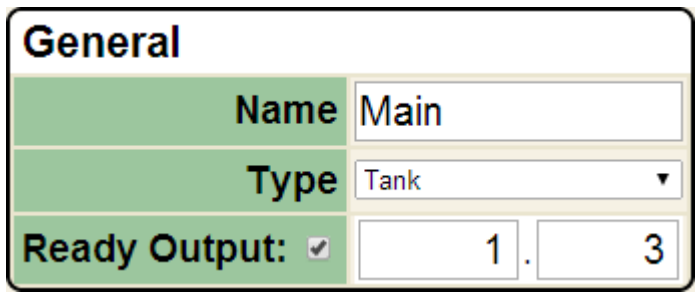
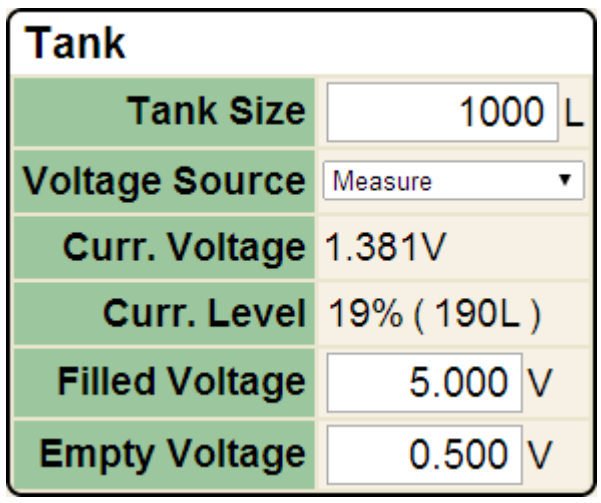
General



The general box displays the same settings as the overview box for the water source. See above for more information of these settings.

Tank



IF the water source is a Tank or a blending tank this box will be displayed here all the information for configuring a tank will be displayed.

Tank Size: Size of the tank being used for batching, this is not crucial to the control of the tank as the voltage readings determine the actual tank level. This is more for user feed back of the tanks exact level.

Voltage Source: The Remote EpM group the tank level sensor is being reported to.

- ***Measure:*** The tank level sensor is connect to a Remote EpM under the Measure Group.
- ***Check:*** The tank level sensor is connect to a Remote EpM under the Check Group.
- ***Source:*** The tank level sensor is connect to a Remote EpM under the Source Group.

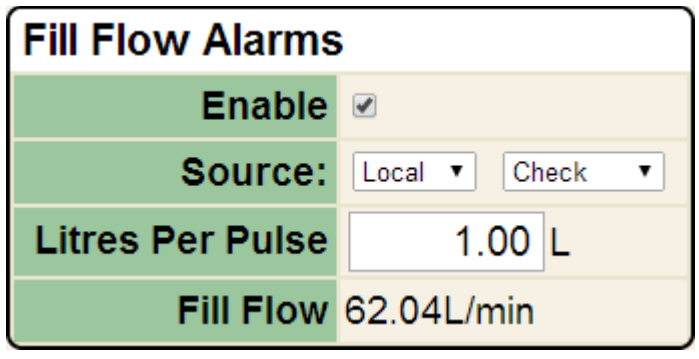
Curr. Voltage: Current voltage on the Moist input of the sensor source selected above.

Curr. Level: Current level calculated from the settings.

Filled Voltage: When the tank is full enter the value being displayed under Curr. Voltage into this field.

Empty Voltage: When the tank is empty enter the value being displayed under Curr. Voltage into this field.

Fill Flow Alarms



IF the water source is a Tank this box will be displayed.

Enable: This box will enable the fill flow alarm on the system. Once ticked and saved additional options will become available.

Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
  - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
  - ***Check:*** Flow source is the Check Remote EpM sensor group.
  - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
  - ***Main Sensor 1:*** Flow source is from Main Sensor 1.

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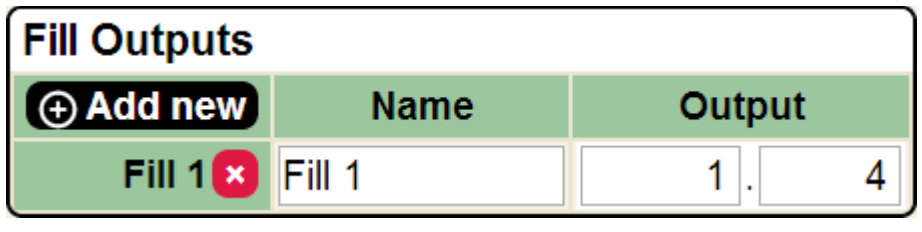
- ***Main Sensor 2:*** Flow source is from Main Sensor 2.
- ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: How many litres is passed through the flow meter before a single pulse is generated, this is specified by the manufacture of the meter.

Fill Flow: Current flow being measured by the configured sensor source.

Fill Outputs

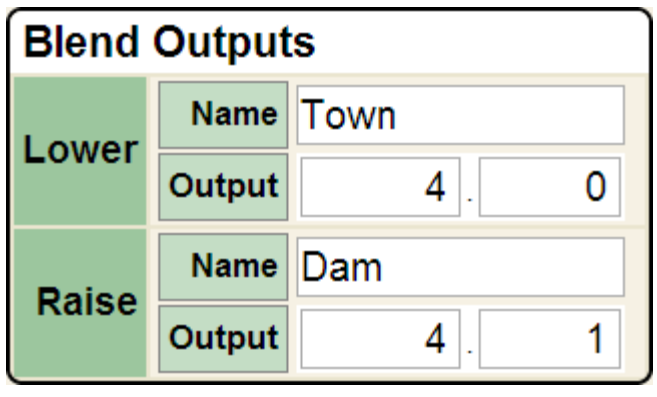


IF the water source is a Tank this box will be displayed. Fill outputs can be added for removed from the tank, a tank can support up to 4 fill outputs.

Name: Name given to the output for identification purposes.

Output: Address of the output the fill valve is physically wired to.

Blend Outputs



IF the water source is configured as a blending tank this box will be displayed.

Lower

The lower output is used to supply water that will effectively lower the nutrient level of the tank, this is usually connected to town water.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

Raise

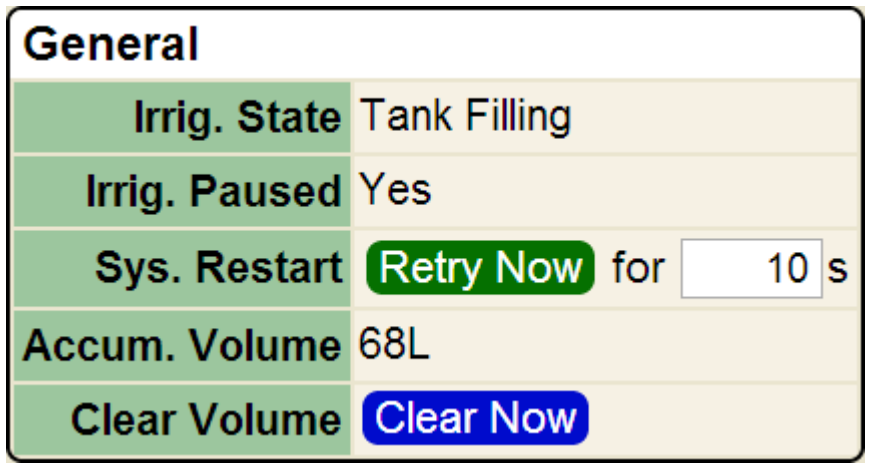
The raise output is used to supply water that will effectively raise the nutrient level of the tank, this is can be connected to a pre-dosed water supply or a Dam the collects run off.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

Settings

General



Irrig. State: Current state of the irrigation system. This can be driven from multiple installed functions

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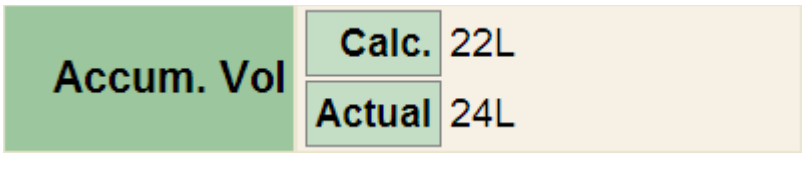
Irrig. Paused: Is the irrigation system currently in a paused state.

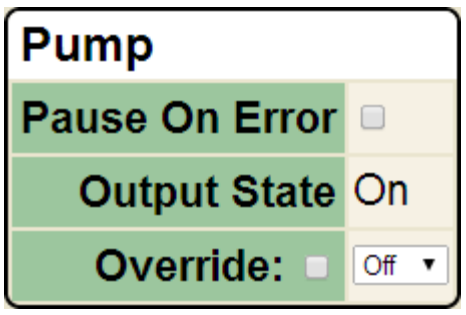
Sys. Restart: If the system is currently paused this box will be displayed, if the irrigation system is in a state in which it might need to be resumed to try and clear this. If a flow error or pump error has occurred the system needs to start running again in order to check if the error conditions have been resolved. Pressing the retry now button will unpause the system and hold it unpaused for the time specified in the box. After this time if an error conditions still exist on the system it will return to the paused state.

Accum. Volume: Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.



Clear Volume: This will immediatelty set the Accumulated volume reading back to zero. This will happen to both the calculated and actual volumes on the system.

Pump



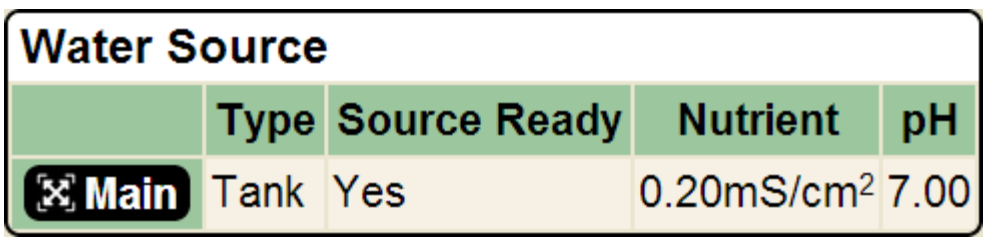
This box will be displayed only if a Main pump has been installed on the configuration page.

Pause On Error: If communications to the output module that controls the pump or the pump switch has been set to manual on this module, an error will be generated by the system. Ticking this box means that when an error like this occurs the system will be paused and stop all irrigation.

Output State: Current state of the pump output.

Override: Ticking this box will override the output to the state specified in the drop down box.

Water Source



Depending on the type of water source configured on the system the additional options displayed on the expanded menu will differ. The common readings are displayed here, pressing the expand button will bring up extra settings boxes.

Type: Current type of water source configured.

Ready: Is the water source ready. Note Town Water sources are always ready.

Nutrient: Current nutrient level of the water source.

pH: Current pH level of the water source.

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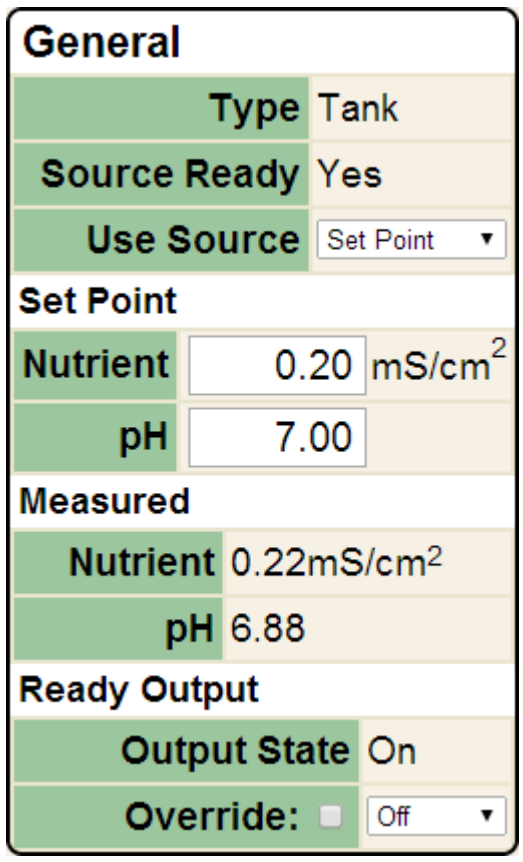
General



The general tab the same for all types of water sources, it is the only options box available for a Town Water and Main Tank source.

Type: Type of water source.

Source Ready: Is the water source currently ready this can be set from a number of places depending on the type configured. For a Tank and Blending tank the locate ready when above is responsible for that, also the failsafe setting. When using main tanks the same settings will drive this value but are based on the main tank ones. A town water source is always ready.

Use Source: Certain dosing alogrithms in the system required a starting point in order to operate correctly. This starting point is the water nutrinet and pH levels. These can be be either from a set point or measured using a Source EpM sensor group.

Set Points

Here both a nutrient and pH source set point can be configured.

Measured

The current nutrient and pH levels being measured from the Source EpM group are displayed here.

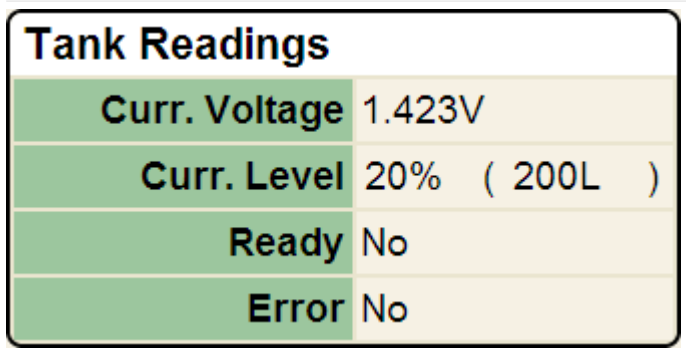
Ready Output

The ready output sub box will only be displayed if a ready output has been configured on the water source.

Output State: Current output state of the ready output.

Override: Ticking this box will override the ready output to the state specified in the drop down box.

Tank Readings



If a water source is configured as a tank or blending tank this reading box will be displayed, it contains the major readings relating to the tank.

Curr. Voltage: Voltage being reported on the Moist input of the sensor selected to be the source for this tank.

Curr. Level: Based on the size and voltage levels configured for this tank the Curr. Voltage level is converted into a percentage full value as well as a approximate litre value.

Ready: is the tank ready.

Error: Is the an error on the tank.

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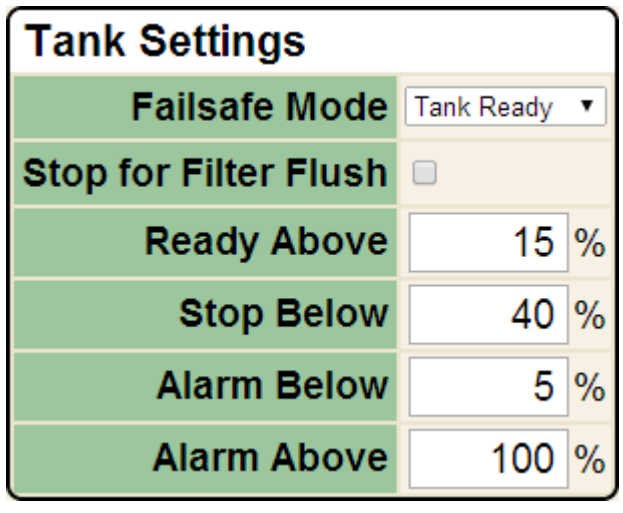
Tank Settings



If a water source is configured as a tank or blending tank this settings box will be displayed, it contains the major settings for a tank.

Failsafe Mode: If the voltage reading is ever lost the system has no idea what level the tank is at, if a water source is not ready the system will not be above to irrigate. Setting this to Ready means that if the voltage level from the sensor is ever lost the tank will instantly become ready, meaning that irrigation can still happen insuring plants can still be watered. If this is set to Delay the system will become paused as the water source will no longer be ready for irrigation's.

Stop for Filter Flush: If a filter flush functionality has been configured on the system it maybe be necessary to stop the tank from filling during this operation. If this box is ticked and a filter flush is started the tank will stop filling operations.

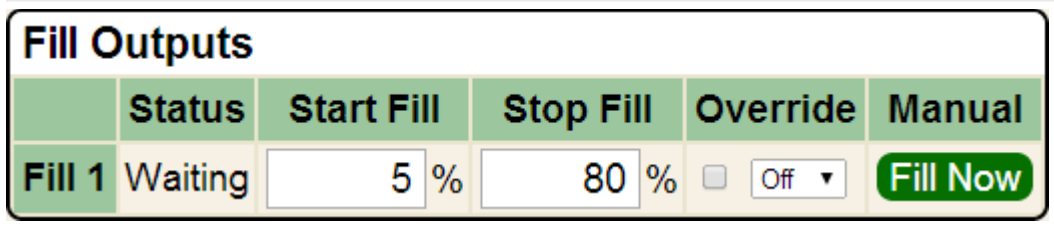
Ready Above: Once the tank has calculated it is at least this full the water source will become ready an irrigation's are allowed.

Stop Below: If the tank ever drops below this level the water source will become unavailable and irrigation's will not be allowed. The different ready and stop levels are used because the tank might usually fill a lot faster than it is irrigated out. This means a tank can be ready sooner and only stop if it drop below a critical level.

Alarm Below: If the tank ever drops below this percentage full an alarm event will be generated by the system.

Alarm Above: If the tank ever goes above this percentage full an alarm event will be generated by the system. If a tank is configured correctly a percentage over 100% should not be possibly if it does the tank configuration might need to be adjusted to insure the reported voltage is converted into a true representation of the fill level.

Fill Outputs



If a water source is configured as a tank type it displayed this setting box.

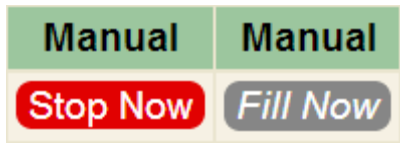
Status: Current status of the fill output.

Start Fill: When the tank level drops below this value the fill output will be turned on.

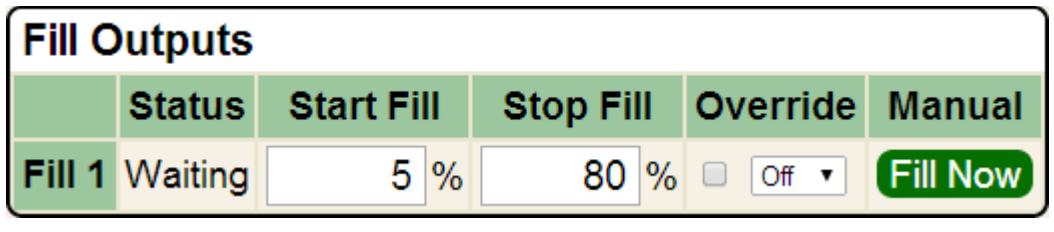
Stop Fill: Once the tank level is above this value the output will be turned off.

Override: Ticking the box will force the output to the state specified in the drop down box.

Manual: When a fill output is in the waiting state it can be manual triggered for filling by Pressing the fill now button, this will turn on the output until the tank level reaches the stop fill level or the Stop Now button is pressed. If the fill output is currently running the stop now button will be displayed. Pressing this button will cause the fill output to turn off until the tank level drops below the start fill level or the Fill Now button is pressed. If an error has occurred in which it is not possible to manual run the output this button will be disabled.



Fill Flow Alarm



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If a water source is configured as a tank type it displayed this setting box.

Fill Flow: Current flow rate being measured on the fill flow sensor configured.

Alarm if: If the tank is currently filling e.i. any fill output is currently on and the flow being measured on the meter drops below the set level for the specified amount of time and alarm conditions has occurred.

Stop Fill on Alarm: Ticking this box means that if the above alarm conditions are meeting all fill outputs will be stop until this is cleared.

Alarm State: Current state of the alarm.

Stop Output: Has the alarm caused the fill outputs to stop. If this is true the fill outputs state will also change to indicated this.

Alarm State	Alarm Stopped
Stop Outputs?	Yes
Clear Stop	Clear Now

Clear Stop: Pressing the clear now will remove the stop conditions placed on the fill outputs by the alarm. The tank will return to normal operation. This button will only appear if an alarm condition has occurred which stopped the outputs from operating. When the alarm conditions arises the fill outputs status will change to indicated this and the manual buttons will be disabled.

Status
Stopped (Alarm)

Blending Control

Blending Control

Mode	Filling
Blend Above	50 %
Desired Nutrient	1.50 mS/cm^2
Deadband	0.50 mS/cm^2

The blending control box will only be displayed if a water source has been configured as a blending tank. The main blending control of the tank is done by the use of a desired nutrient level setting as well as a deadband. The tank also has a blend above setting which is the level the tank must get to before lower and raise outputs can start to be turned off. Below this level the tank is in fill mode where both output will be on in order to fill the tank as fast as possible. Once a tank has reached it blend level it will use the current nutrient level in order to control the outputs. If the current nutrient level drops below the desired level the raise output will be switched on, if the nutrient level reaches a point which is equal to the desired level plus the deadband the raise output will switch off. If the nutrient level is above the desired level the lower output will be switched on, if the level equal the desired level minus the deadband this output will be switched off. This control method means that both output are usually constantly on and will only switch off if extremes are meet. This is because not only are we trying to maintain a desired level of nutrient with in the tank, we are also try to fill it.

Mode: Current mode of the blending tank. If the tank is currently filling both the lower and raise fill output are on this is to give an even mix of both as well as fill the tank as fast as possible. Blending of the two sources only happens when the tank is sufficiently full.

Blend Above: When the tank level has reach a certain level blend of the water sources can occur.

Desired Nutrient: Desired nutrient level of the water source. This is the main setting that controls the lower and raise outputs.

Deadband: The amount the nutrient level must change by before a change in the fill outputs will occur.

Fill Outputs

Fill Outputs

	Name	Status	Override
Lower	Town	Filling	☐ Off
Raise	Dam	Filling	☐ Off

The blending control box will only be displayed if a water source has been configured as a blending tank.

Lower

- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.

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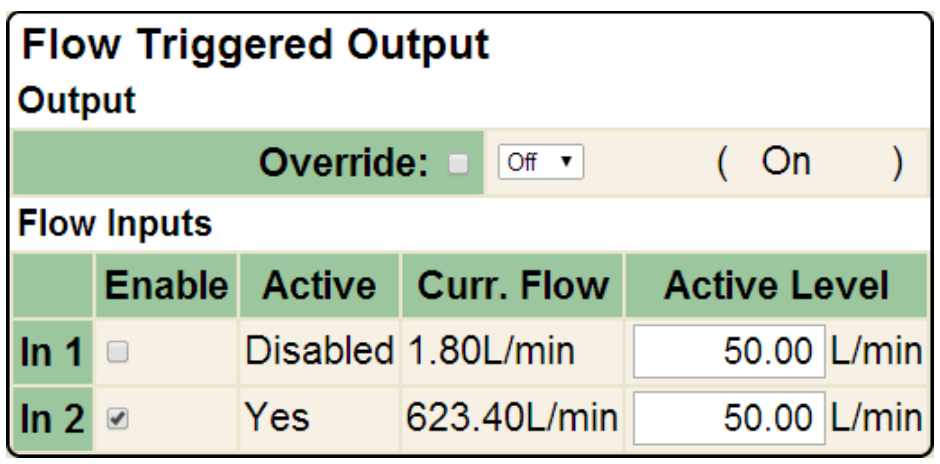
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Raise

- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Flow Triggered Output



Override: Ticking this box will override the output to the state specified in the drop down box.

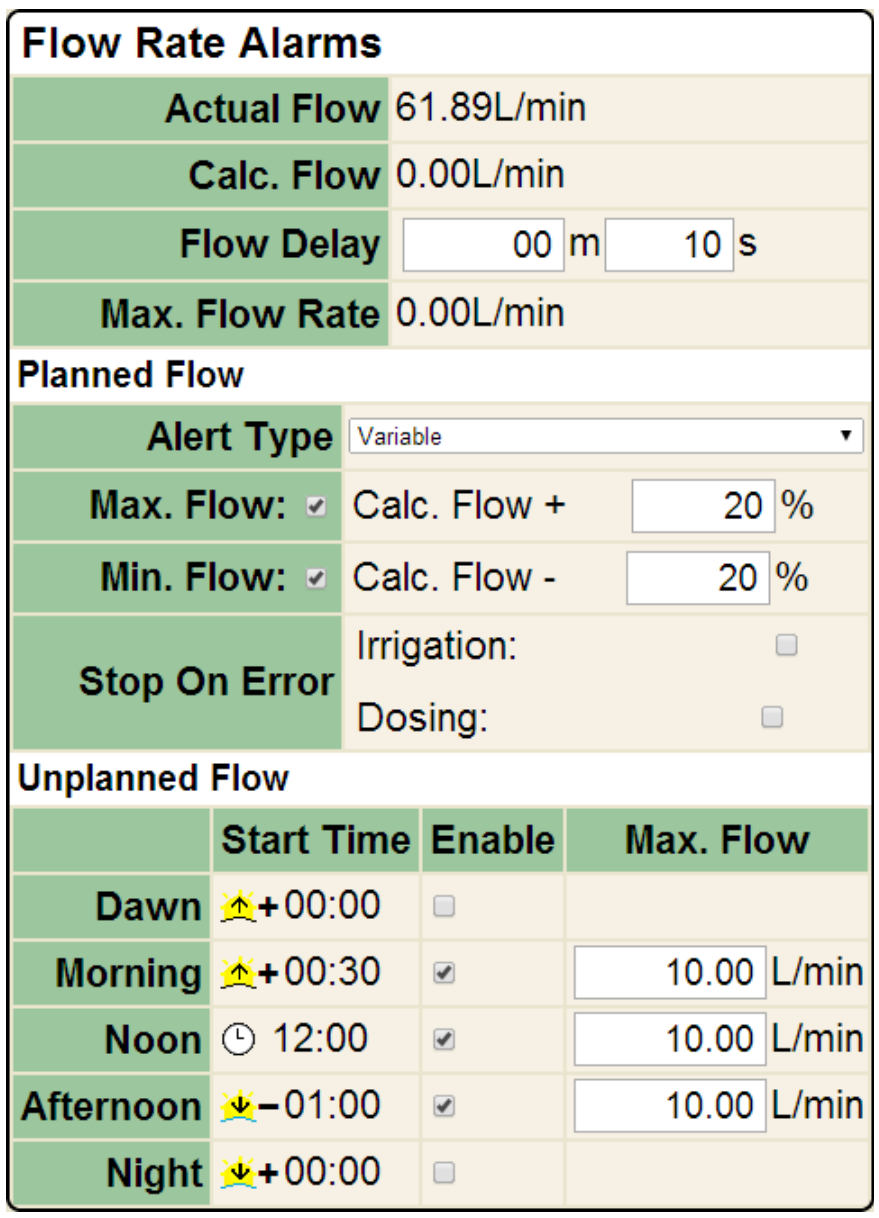
Enable: In order to use a configured flow input as a trigger for this output it must be enabled.

Active: Has the current flow level meet the required level in order to turn on the output.

Curr. Flow Current flow rate being report by the configured input.

Active Level: The level the flow must reach before it is deemed to actually be active and the output to be turned on.

Flow Rate Alarms



This box will on be visible if the system has a mesaure flow meter properly configured. Though there is a separate alarms tab located on the settings page that is used for generic alarm settings rather than specified levels. An irrigation system has two flow rate alarms that become active under

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different conditions (Planned and Unplanned).

Actual Flow: Current flow rate being measured by the system.

Calc. Flow: The current flow that should be present on the system derived from the station flow rate settings.

Flow Delay:: When a system begins to water it can take a small amount of time for the pump to spool up. This lag can also happen when the flow is changing due to stations size. This setting lags the measurement by this factor to stop incorrect alarms being generated.

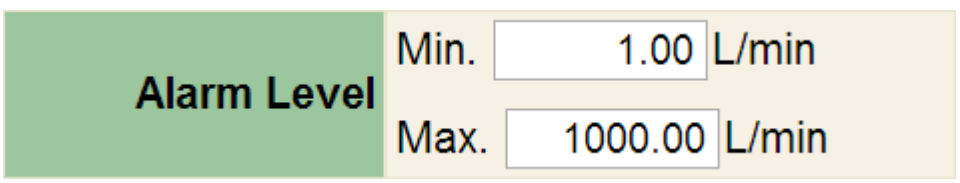
Max. Flow Rate: Current maximum flow rate expected on the system given its current state of operation.

Planned

A Planned flow alarm becomes active when we are expecting flow to be present on the system e.i a irrigation has become active. The system can be configured to generate both minimum and maximum flow rate alarms based on the flow of the system. The flow rate variable configured for each station is compared to the current flow rate being measured if this various by a certain amount an error is said to have occurred and an alarm should be generated. When an event such as this occurs it is possible to stop the Dosing modules on the system if installed and or stop the irrigation completely.

Alert Type: The type of alarm used for planned flow.

- ***Disabled:*** No planned flow alarms will be generated.
- ***Variable:*** The minimum and maximum flow levels vary depending on the calculated flow rate of the system.
  Max. Flow: Ticking this box means that the maximum planned flow rate alarms are enabled on the system. If the actual flow is ever above the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Max level will still be used by this will be set to a range that cannot be reached by a irrigation system.
  Min. Flow: Ticking this box means that the minimum planned flow rate alarms are enabled on the system. If the actual flow is ever below the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Min level will still be used by this will be set to a range that cannot be reached by a irrigation system.
- ***Set Levels:*** The minimum and maximum flow level are fixed and the actual flow rate is compared to these directly.



Min.: Minimum flow rate allowed on the system when irrigating. If the actual flow drops below this for a certain time, generate an alarm.
Max.: Maximum flow rate allowed on the system when irrigating. If the actual flow rate goes above this for a certain time, generate an alarm.

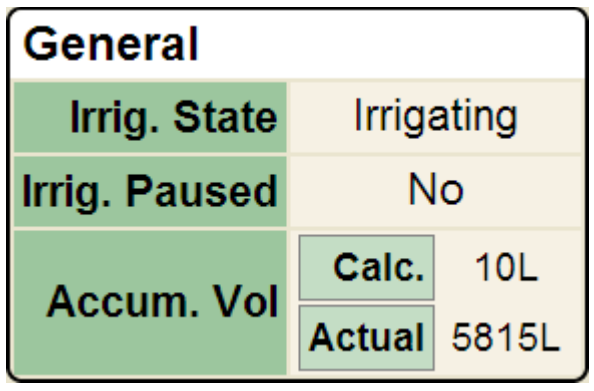
Stop On Error: When an error occurs on the system it is possible to stop either the Dosing Modules or entire irrigation system.

Unplanned Flow

A Unplanned flow alarm becomes active when we are not expecting flow to be present on the system e.i when there is no active irrigation. The system can be configured to enable this alarm per time period. It is also possible to set the level of flow required per time period in order to validate the alarm. If the actual flow rate is above the Max.Flow level for a specific amount of time and it is enabled an alarm will be generated. Note the time period enable needs to be saved in order to see and edit the Max. Flow variable.

Readings

General



Field	Description
Irrig. State	Current state of the irrigation system. This can be driven from multiple installed functions
Irrig.	Is the irrigation system currently in a paused state.

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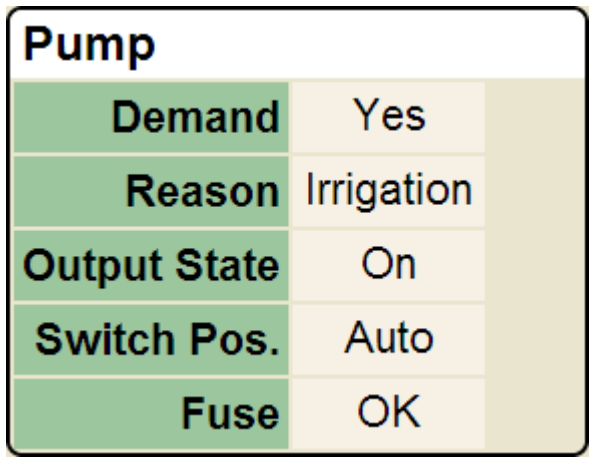
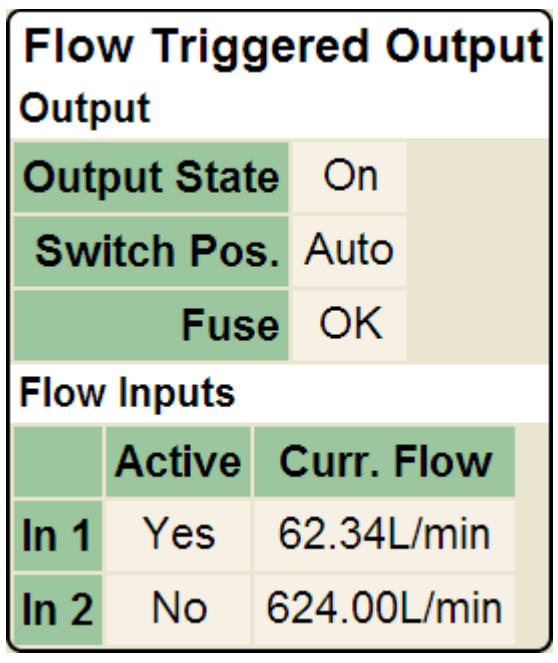
Field	Description
Paused	
Accum. Volume	Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.

Pump



Field	Description
Demand	Is there current;y any demand in the system the means the pump should be running.
Reason	This field is only visible when a demand is active there are only a few source that can demand the pump to run, *Irrigation:* an irrigation is active on the system. *Filter:* The run pump on filter flush setting has been selected and the system is currently flushing. *Batch:* The batch system is calling for the pump to be active, this means the run pump while filling or stirring settings have been selected and the batch module is currently performing one of these actions.
Output State	The current state of the output for the pump, *On* or *Off*
Switch Pos	The switch position of the pump output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Flow Triggered Output



Field	Description
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*
Active	Is the configure input sources flow reached the desired level to turn on the output.
Curr. Flow	Current flow being report from the configure sensors for this flow input.

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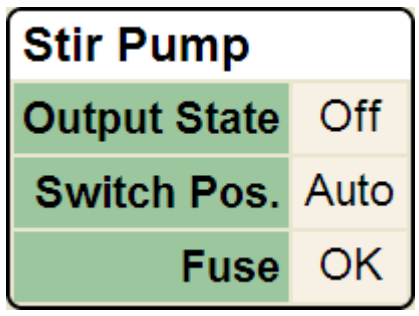
Stir Pump

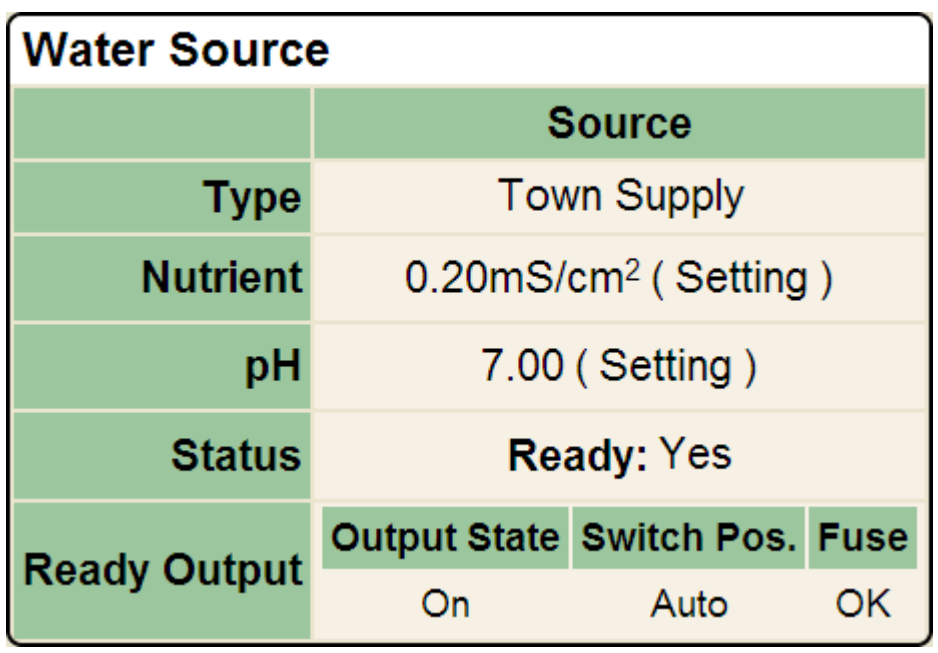


A stir pump can only be configured on an Inline dosing irrigation system and has been properly configured under the Configuration -> Dosing section. It will become active when the system is running an irrigation in order to help stir nutrient and pH injections through the output going water.

Field	Description
Output State	The current state of the output for the stir pump, *On* or *Off*
Switch Pos	The switch position of pump output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Water Source

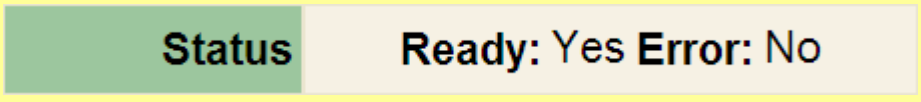
General Readings



Depending on how a water source is configured the displayed information in this box will vary. Above visible readings for a town water source these are common readings among all types of sources.

Field	Description
Type	The current type of the configure water source, *Town Water* , *Tank* , *Blending Tank* or a *Main Tank*.
Nutrient	The current water source nutrient level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
pH	The current water source pH level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
Status	Whether the water source is ready. Note a town water source is always ready.
Ready Output	If a ready output has been installed on the water source the outputs information will become visible here. **Output State** The current state of the output for this injector, *On* or *Off*. **Switch Pos** The switch position of this injectors output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

If a water source has been configured as a tank or blending tank the status box mentioned above will contain a an error reading as well to indicate whether the current tank has an error condition present.



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Tank Readings

Curr. Level	19% (190L)		
Outputs		**Fill 1**	**Fill 2**
	Status	Filling	Filling
	Output State	On	On
	Switch Pos.	Auto	Auto
	Fuse	OK	OK

Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field all the current readings for each fill output configured on tank are displayed. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the output for the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

Blending Tank Readings

Curr. Level	51% (510L)		
Outputs		**Lower**	**Raise**
	Name	Town	Dam
	Status	Running	Running
	Output State	On	On
	Switch Pos.	Auto	Auto
	Fuse	OK	OK

Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field the lower and raise fill output readings are displayed. **Name** Unique identifier given to this output. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

Flow Rate

Flow Rate	
Actual Flow	62.34L/min
Calc. Flow	80.00L/min
Planned Flow	
Enabled	Yes
Min. Flow Rate	64.00L/min
Max. Flow Rate	96.00L/min
Unplanned Flow	
Enabled	No
Max. Flow Rate	10.00L/min

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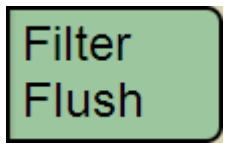
For this box to be visble a flow meter must be correctly installed and configured on the irrigation system.

Field	Description
Actual Flow	Current flow rate being measured from the configure sensor source.
Calc. Flow	Current calculated flow the system is expecting to see based on its current state.
Planned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Min. Flow Rate	The minimum flow the system is allowed to have with generating an alarm condition, this is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Unplanned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on alarm level settings.

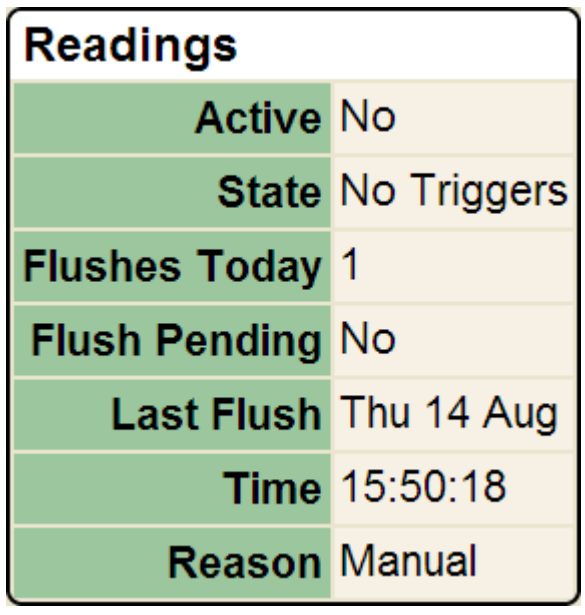
Filter Flush



If a filter flush is installed on the system a separate tab will be appear on the tertiary menu. When a filter flush is occurring the system is running water backwards through the pump. This means that irrigation's will be paused or unable to start during this period.

Settings

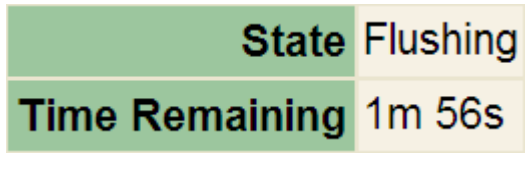
Readings



Active: Is the filter flush currently active.

State: Current state of the filter this can differ from the active reading and reflects other aspects of the filter flush system.

Time Left: Time remaining for the active filter flush cycle, this will only be displayed if the system is currently performing a filter flush.



Flushes Today: Number of flushes that have occurred today since midnight.

Flush Pending: If there is a flush pending the trigger source will be displayed here, a trigger can only be pending if the use of a flush window otherwise flushes will happen whenever they are demanded. If multiple triggers have occurred before the filter flush can run, the sources will be listed here.

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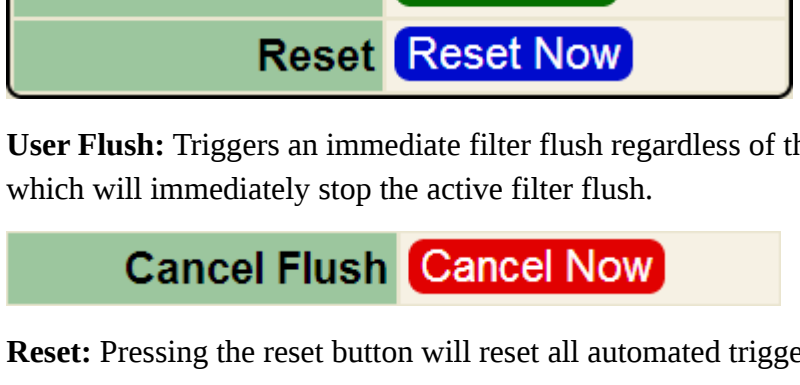
Last Flush: Date of the last filter flush.

Time: Time when the last flush finished.

Reason: the trigger source for the last flush.

Settings



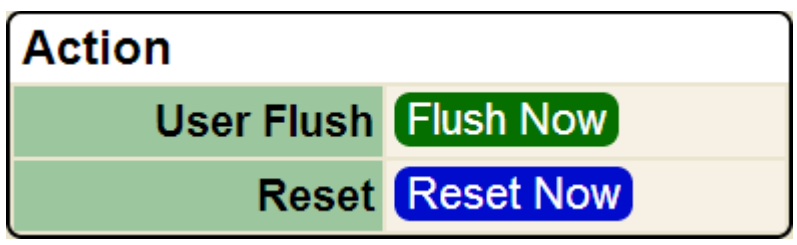
Flushes / Day: This sets the amount of flushes allowed per day, this is a maximum set point that can not be exceeded by any of the flush triggers except for a manual flush.

Backwash Time: The time it takes to run water backwards through the filter in order to flush it properly. This is time is sometime giving by the filter manufacturer. It may also be specified as a volume.

Run Pump: If this box is ticked when a filter flush becomes active the main system pump will also be turned on.

Min. Water Level: If a tank is the source water for the flush it might required more water then what is currently in the tank. Using this value it is possible to specify the amount of water that must be present from the water source in order to run a flush, otherwise it will not happen.

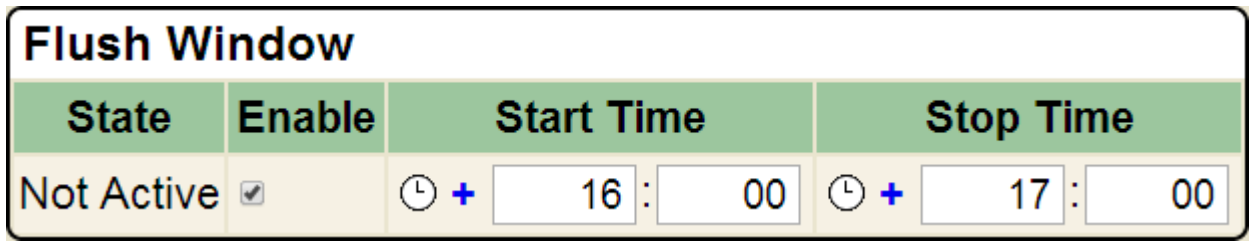
Action



User Flush: Triggers an immediate filter flush regardless of the state, once a filter flush has been activated this button will change to a cancel button, which will immediately stop the active filter flush.

Reset: Pressing the reset button will reset all automated triggers back to zero.

Flush Window



The flush window enables a set time of day for automatic flushes to occur. If a window is enabled the volume and interval triggers can only run between the time specified.

State: Current state of the window.

Enable: If a flush window is to be used on the system this value must be ticked.

Start Time: Time when the window starts, this can be a set time or an offset from sunrise/sunset.

Stop Time: Time when the window ends, this can be a set time or an offset from sunrise/sunset.

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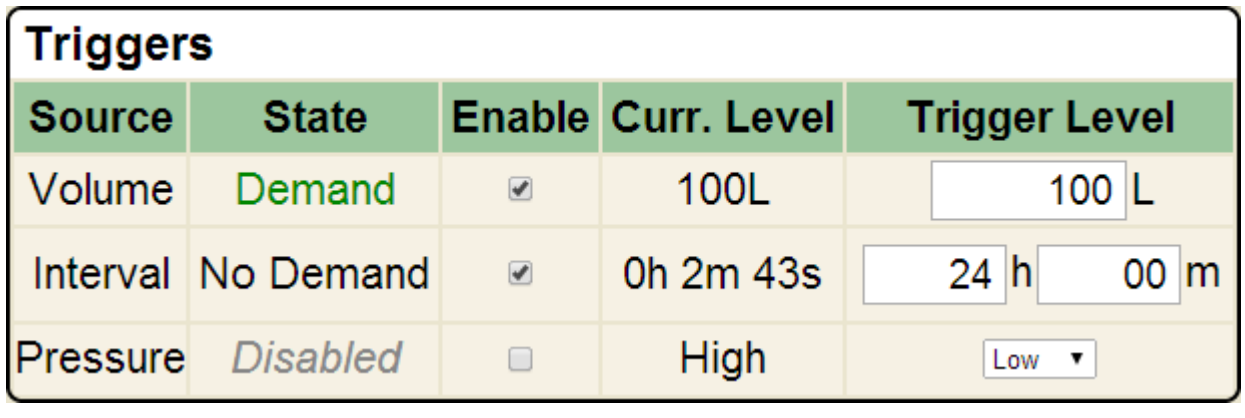
Triggers



There are three sources that can trigger a filter flush within an irrigation system. Both the Volume (actual only) and Pressure triggers required sensor input, if they are not installed a No Sensor error message will be displayed. The Volume and Interval triggers are bound by the flush window, so will only trigger during the window if enabled. All the triggers are also bound the number of flushes per today as well as the water source level. If any of these conditions are not meet but a trigger is demanded a Demand message will be disabled. Once a flush has completed the current levels will be reset, except for the pressure level since that is driven directly from a sensor. If any of the triggers are *Disabled* they will not be able to trigger.

Volume
A volume triggered filter flush is driven from either the calculated or measured volume on the system. If the measured volume is being used a flow meter must be correctly configured on the system.

Interval:
This is a simple time based triggered once a certain amount of time has passed since the last filter flush a new trigger will be generated.

Pressure
This is driven directly from a pressure sensor installed onto an EpM sensor within the system, this must be properly configured for this trigger to work.

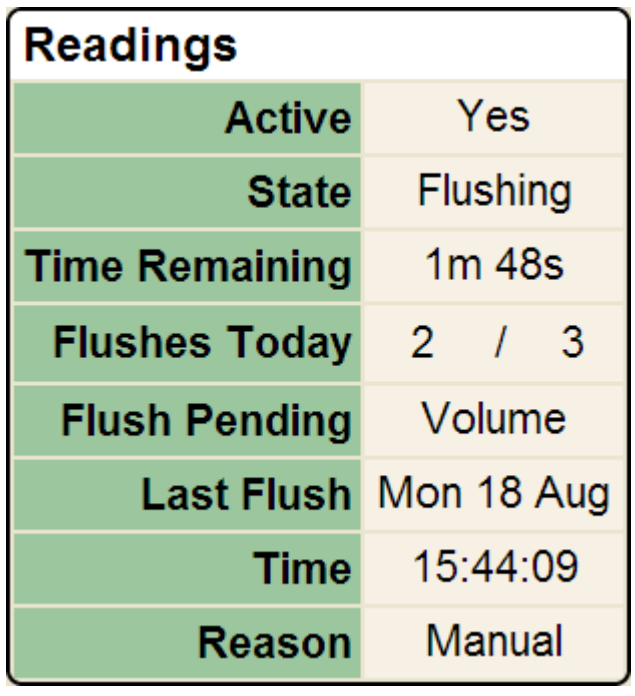
State: Current state of the trigger.

Enable: This box must be ticked if the source is to be used as a trigger.

Curr. Level: Current reading of the source.

Trigger Level: Level the source reading is compared to in order to generate a trigger.

Readings



Field	Description
Active	Is a filter flush currently being performed by the system
State	Current state of the filter flush module.
Time Remaining	This reading will only be displayed if a filter flush is currently active on the system. It displays how long is left until the flush cycle has completed. This is reset to zero when the system reaches its end of day.
Flushes Today	Number of flushes that have occurred today out of the maximum total allowed.
Pending Flushes	If a flush window has been configured on the system or the number of flushes has been exceeded any triggers will be queued until it will be allowed to run again. The source of this queued flush will be displayed here.
Last Flush	Date of last flush performed by the system.

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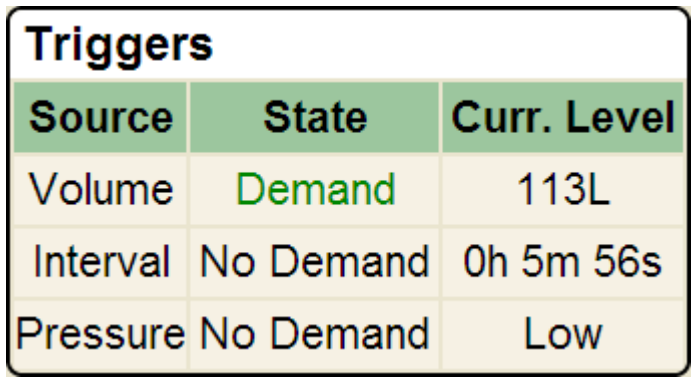
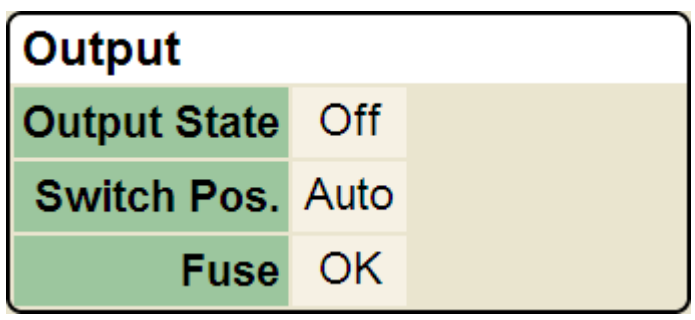
Field	Description
Time	Time of the day the flush occurred.
Reason	The trigger reason for this flush.

Triggers



Field	Description
Volume	State of the volume trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Volume	State of the interval trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Pressure	State of the pressure trigger on the filter flush module, this will only be displayed if the pressure trigger has been correctly set up on the water system configuration page. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level is driven directly from a sensor input and will only change based on physical feedback from the pressure sensor.

Outputs



Field	Description
Output State	The current state of the filter flush output, *On* or *Off*
Switch Pos	The switch position of the output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Sensors

Each irrigation system can have a three different groups of sensors used for ob

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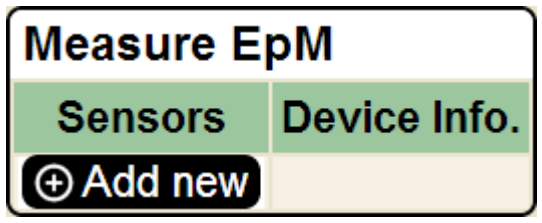
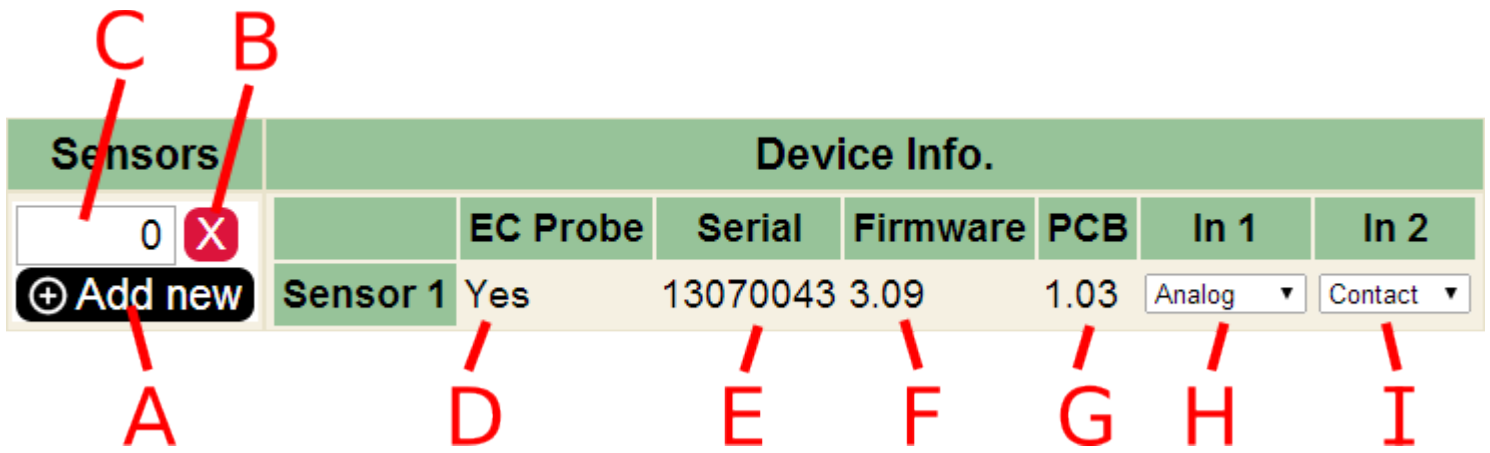
Configuration

Measure EpM



This is the group of readings designated for the main readings of the system. This group reports the Main Nutrient, pH and Flow for the system.

After adding a new Remote EpM to the sensor box the Sensors field and the device info. box will change.

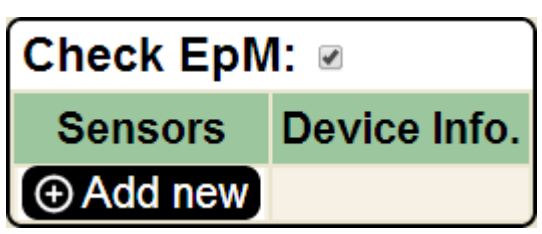


Annotation	Name	Description
A	**Add new button**	Adds an EPM sensor
B	**Delete button**	Deletes an EPM sensor
C	**Sensor address**	The address of the sensor. Each box must be populated with the corresponding address of the EpM device
D	**EC Probe**	Does the Remote EpM currently have an EC Prove attached?
E	**Serial**	Serial number of the device connected under that address
F	**Firmware**	Current version of the firmware this device is running
G	**PCB**	PCB version of the device
H	**In1**	• **Contact:** Input 1 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to 5 - 10V when contact is made • **Analog:** Analog voltage is connected to input 1 of sensor • **Moisture:** Moisture probe is connected to Input 1 of sensor
I	**In2**	• **Contact:** Input 2 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to ground when contact is made • **Flow:** Input 2 is a flow meter input, again this should be pulled to ground when contact is made for correct operation

> Sensor information is only available once the configuration has been activated by pushing the **Activate** button

Check EpM

The Check EpM group is used for mainly error checking against the Measure EpM reading. It can also provided general contact closure inputs as well as analog inputs.



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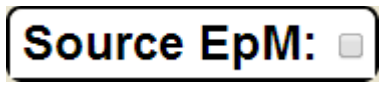
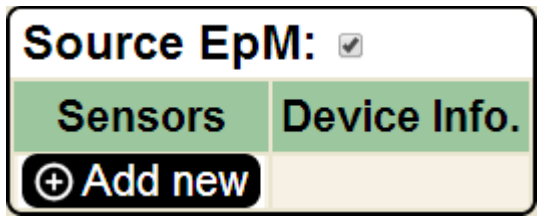
Check EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Source EpM

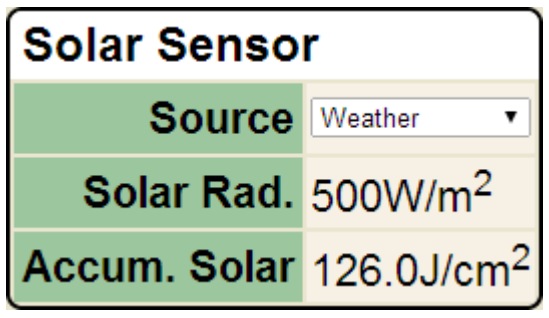


The Source EpM group is mainly used for input information to the system. I can be used to measure the incoming nutrinet and pH level of the systems water supply. It can also provided general contact closure inputs as well as analog inputs.



Source EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Solar Sensor



An irrigation system can have a solar source assigned to it which can be used through the system.

Source: Here the solar source can be specified, depending on which source is selected additional configuration options will be displayed.

- ***Weather:*** The systems solar information will be taking from the weather station.

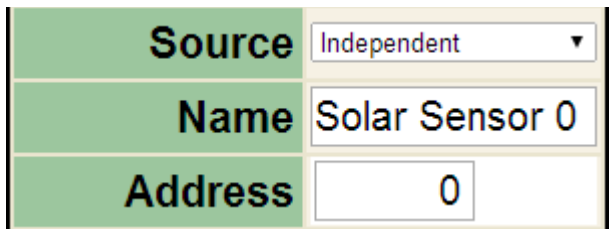
  > A Weather stations needs to be installed and properly configured for this option to be used correctly. See section config weather for information on this.

- ***Independent:*** The system uses the solar reading from a independent solar sensor.
- ***Compartment:*** The system will use the solar information from a specific compartment.

Solar Rad.: Current level of solar radiation that is being measured by the selected source.

Accum. Solar: Accumulated solar radiation since last End of Day.

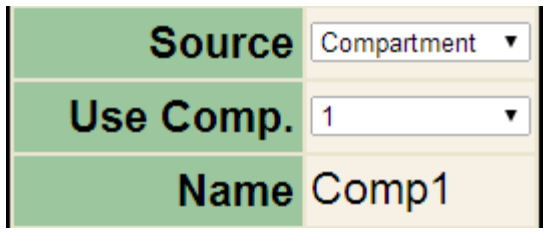
Independent Solar Source



Name: Text can be entered in this field to help identify the solar sensor attached to the system.

Address: The address of the rotary switch the desired solar sensor is set to.

Compartment Solar Source



Use Comp.: The number of the compartment that is to be used be system in order to get solar information must be entered here. In order to use a compartment as a solar source the compartment must be probably configured see configuring climate section for information on this.

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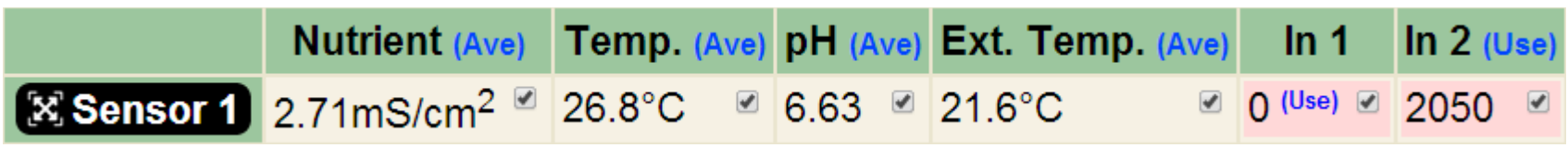
Name: Each compartment can be configured to have a name, this will be displayed here to help ensure the correct compartment has been selected as the solar source.

Overview



The black button that appears in the row heading of the table is an expansion button, this button is given the name of the sensor number added to the system. When this button is pushed additional settings for each sensor will be displayed.

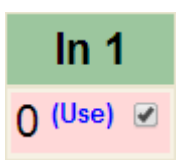
Field	Description
Nutrient	The current nutrient reading from the sensors. If this reading is 0.00 or XX check the connection of the EC probe to the Remote EpM sensors.
Temp.	Each Autogrow EC probe contains a temperature sensors which temperature is displayed here.
pH	Current pH being measured by the probe. Note that due to the nature of a pH measurement even without a probe connected a value can be displayed here.
Ext. Temp.	Current temperature being measured using the pipe temp sensor wired into the Temp pin of the Sensors B Connector. If a probe is not installed this temperature will appear of XX if a sensor is installed and XX is being displayed check the wiring of the probe.

In 1 & 2 Values

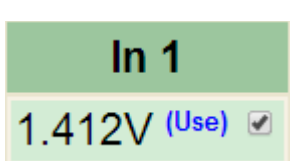
The values displayed in the Input 1 & Input 2 space will differ based on the In 1 setting on the configurations page, this needs to be set correctly to match the desired input signal. Since the type of variable can differ with the same column in the table each specific type of reading will be displayed in a different colour within the cell.

In 1:

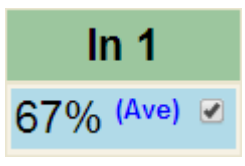
- **CC Count 1:** Current count to contact closure input wired into Moist pin on connector B, the Contact options must be selected under configuration for this to be displayed.



- **Analog:** Current analog voltage being measured by the sensor. This will only be displayed if the sensors In1 value on the configuration page is set to Analog.

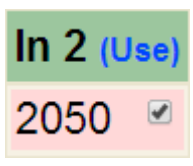


- **Moisture:** Current moisture level being measured by the sensors, the moisture option must be selected under configuration for this to be displayed.



In 2:

- **CC Count2:** Current count of the CC input on the senosrs, this will only be displayed when contact option is selected under the In2 setting on the configuration page.



- **Flow Rate:** The raw flow rate in Hertz (frequency) that is being measured on the sensors. This is in relation to how many pulses a second the sensors is receiving (1 Pulse a second = 1 Hz). The Flow rate option must be selected under the In 2 setting on the configuration page for this to be displayed.

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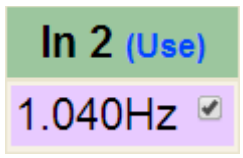


Some or all of the above values are Average Vars.

The addition of the above text and tick box means a variable is part of an averaged set. If the tick box is ticked this means the current reading and all other tick ones will be averaged together. This is useful in order to gain on overall sample of a particular reading. Any invalid readings (e.g. *XX°C*) are omitted from the average even if the box is ticked.

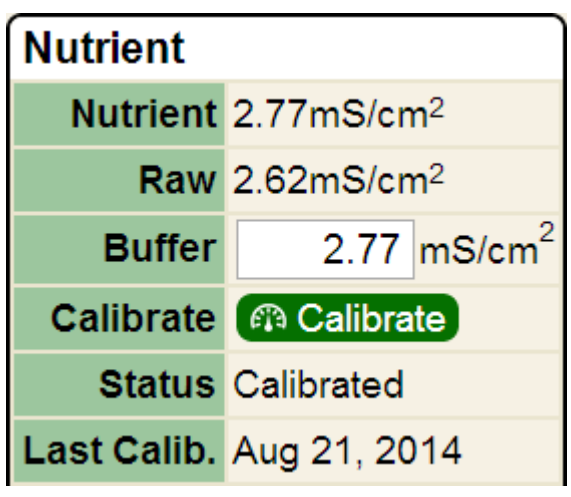
Some or all of the above values are Use Me Vars.

The addition of the above text and tick box means a variable is part of an use me set. If the tick box is ticked this means the current reading will be used as the main reading from the group of sensors. This is useful when multiple sensors within a single group are installed but only one is used for the specific reading. If multiple of the same use me vars are ticked, the system will use the value from the lowest sensor number as the reading (e.g. *Sensor 0 RH* will be used over *Sensor 1 RH*).

Additional Options

Each sensor can be individually calibrated in order to achieve the most accurate readings. Pressing the See All button will return you to the sensors overview page where other sensors additional options can be navigated to.

Nutrient



Field	Description
Nutrient	Current value of the nutrient, this is the value after the reading has been passed through the calibration it is the one that will be added to the average.
Raw	This is the raw reading coming from the sensor before calibration. This can differ from calibrated reading by quiet a lot. This value is displayed in order to give an indication of whether a new calibration should be performed.
Buffer	This is the calibration solution being used, default is 2.77mS/cm^2. This value can be changed to any value of buffer solution.
Calibrate	Pressing the Calibrate button will calibrate the current nutrient reading to the buffer solution set.
Calib	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Nutrient Calibration Procedure

For each Remote EpM sensor within a group that is to be used for nutrient measurement it is recommended to calibrate the probes once a month.

- Clean & rinse the nutrient probe face
- Place the probe into the calibration solution.

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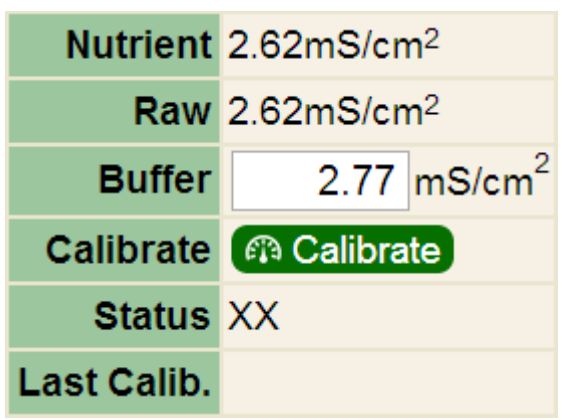
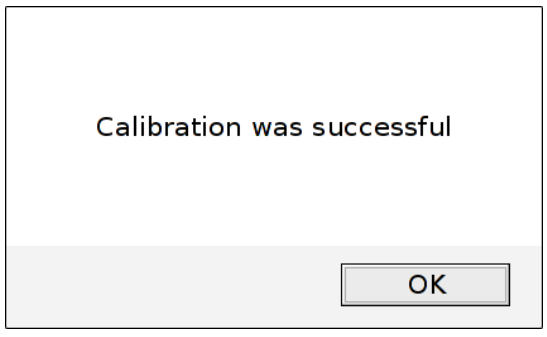
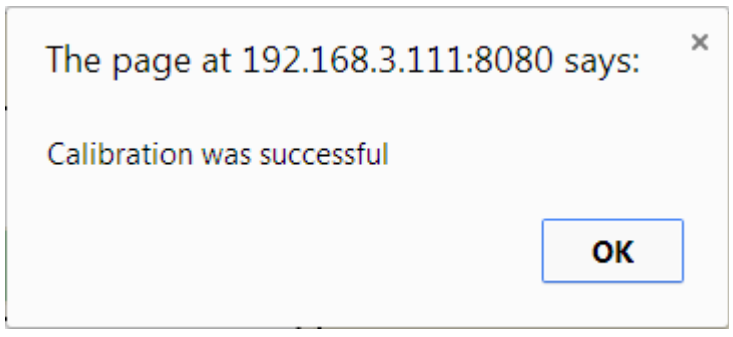
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

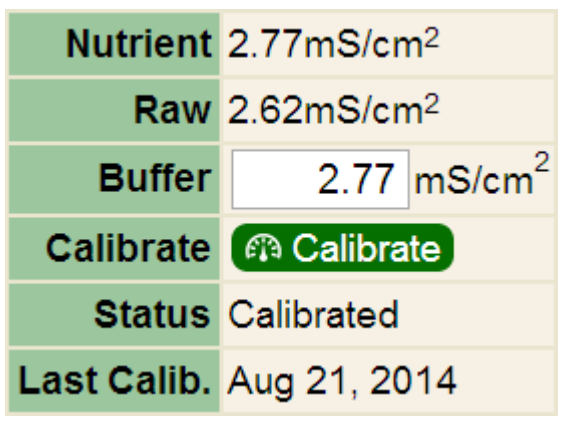


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the nutrient and the temperature to stabilize (Recommended 5 Minutes).



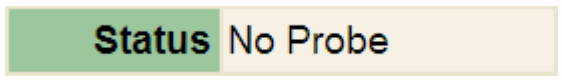


- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

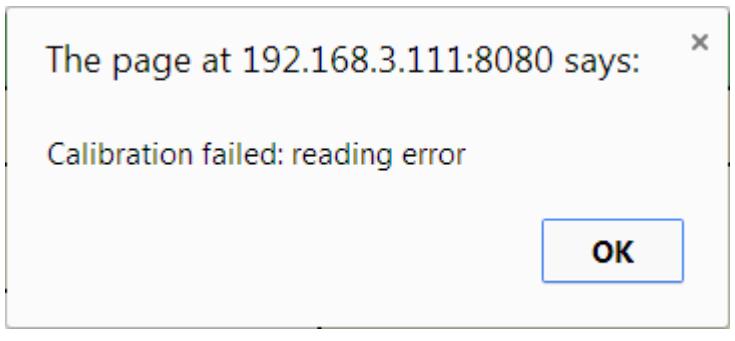


Calibration Errors

- **No Probe**



No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.



- **Out of Range**

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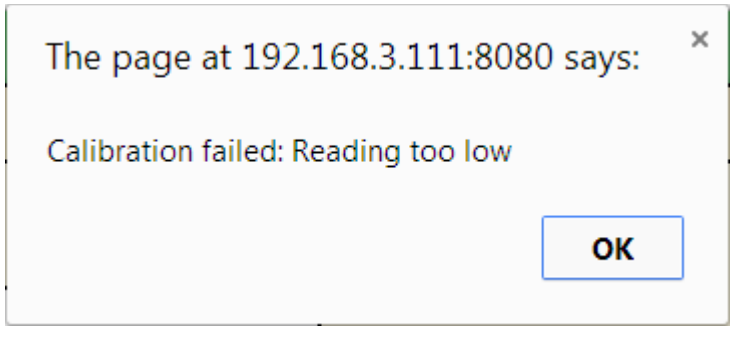
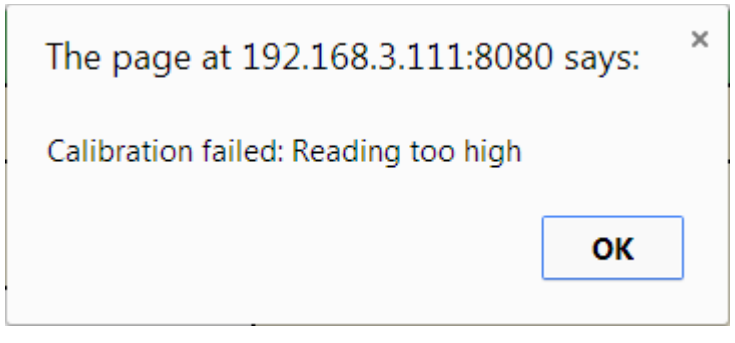
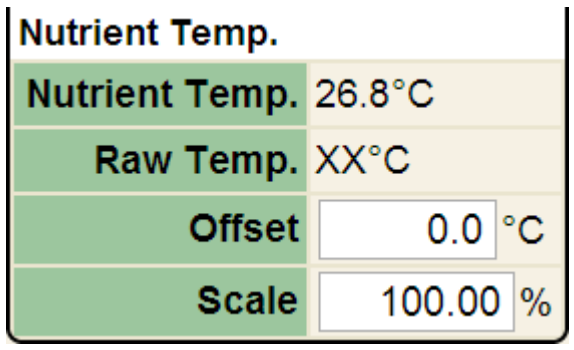
Status	Out of Buffer Range

Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.



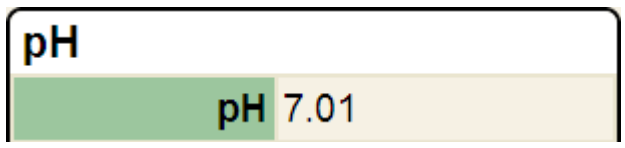


Nutrient Temperature



Field	Description
Nutrient Temp.	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

pH



Field	Description
pH	Current pH value being reported by sensor.

Buffer 1 pH 7

Field	Description
Calibrate	Pressing this button will start a pH7 calibration.
Status	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Buffer 2 (pH4)

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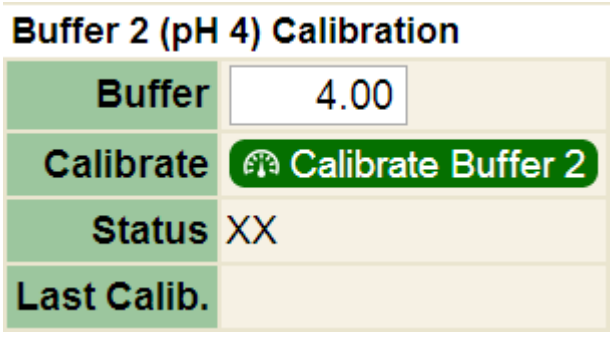
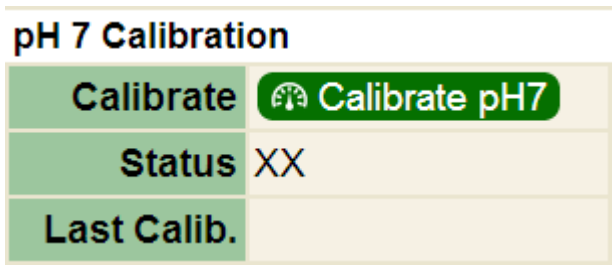


Field	Description
Buffer	pH value of the second buffer used in the pH calibration, this is usually a pH buffer of 4 but can be any other different pH level solution.
Calibrate	Pressing this button will start the second buffer calibration.
Status	Displays calibration information about the sensor.
Last Calib	Display the last calibration date for the sensor.

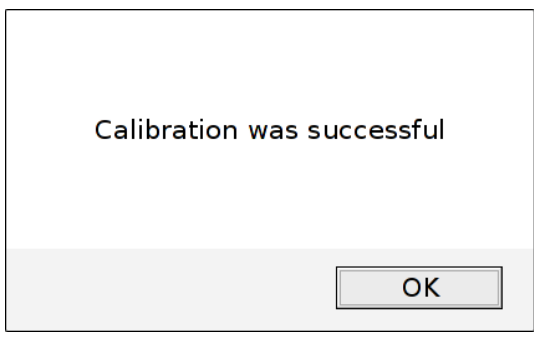
pH Calibration Procedure

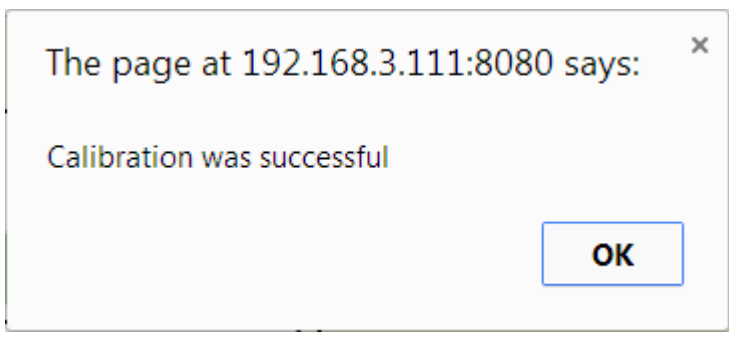
For each Remote EpM sensor within a group that is to be used for pH measurement it is recommended to calibrate the probes once a week to compensate for aging electrodes.

- Rinse the pH Electrode in fresh water.
- Place the probe into the pH 7 calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

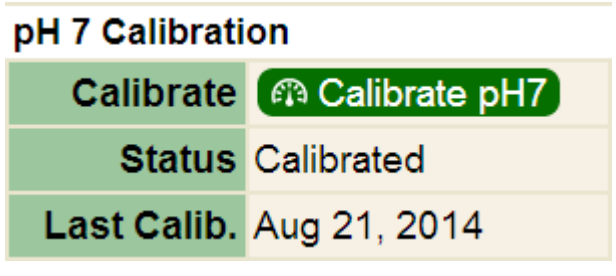


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).





- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- Press the activate button before moving on to the second point calibration (pH 4).
- After a successful calibration the Calib message and time will be updated.



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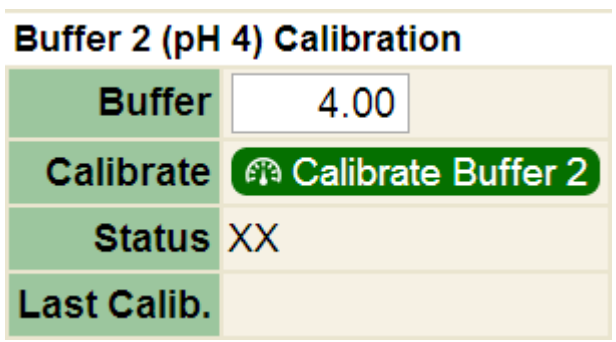
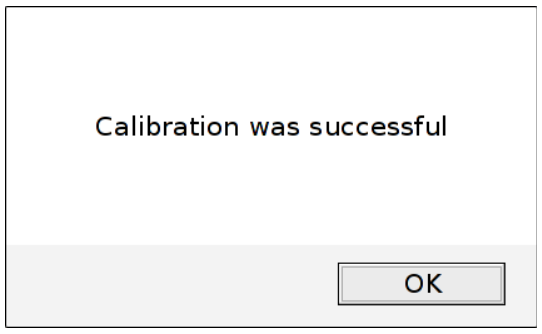
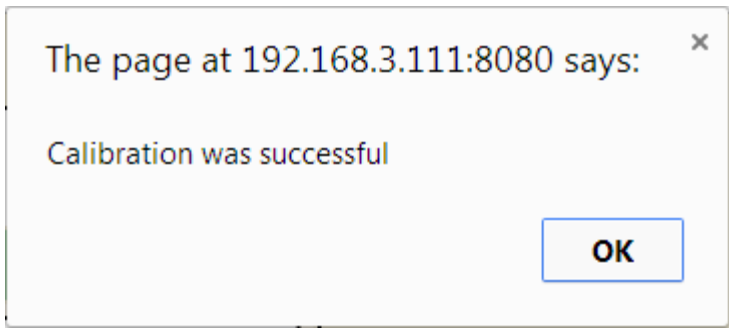
- Rinse the pH Electrode in fresh water.
- Place the probe into the second (pH 4) calibration solution.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

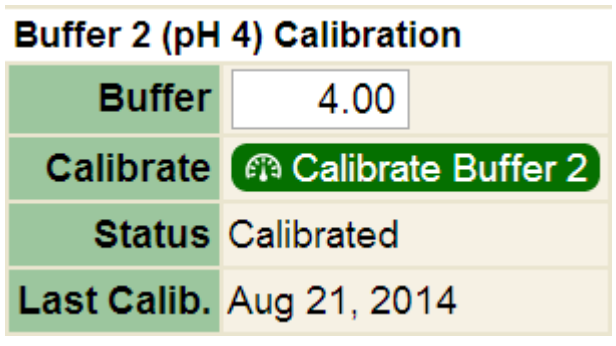


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).



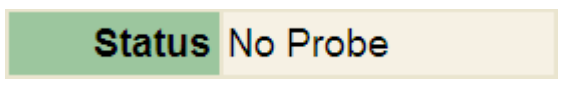


- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

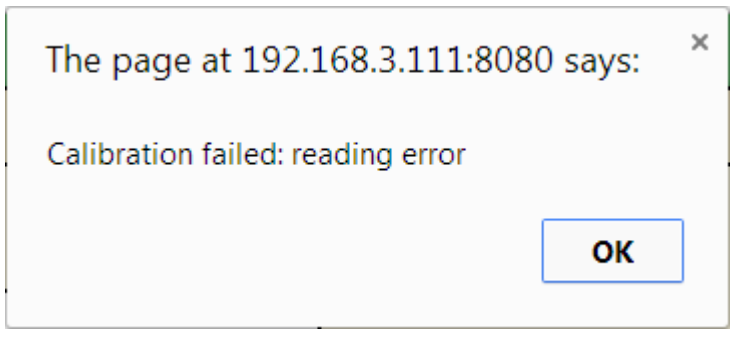


Calibration Errors

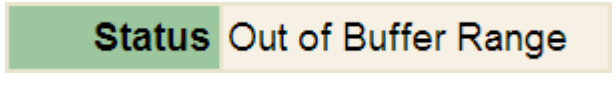
- **No Probe**



No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.



- **Out of Range**



Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to

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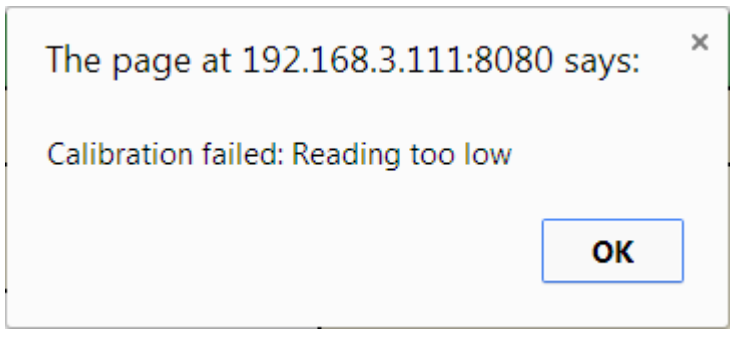
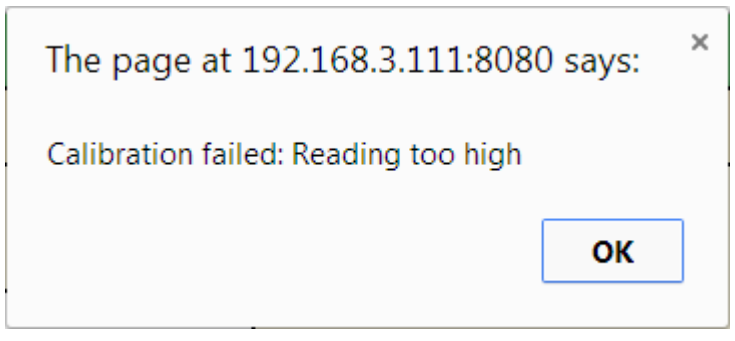
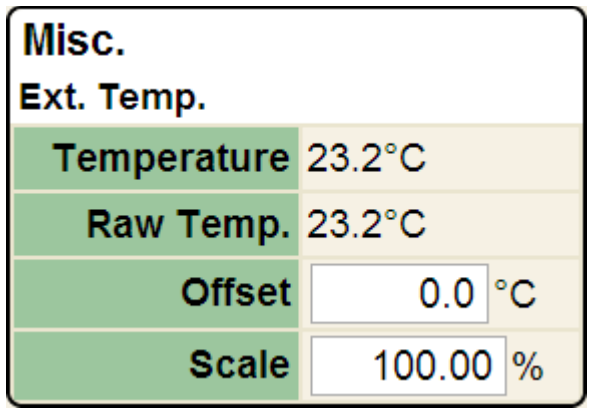
calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.





Misc.

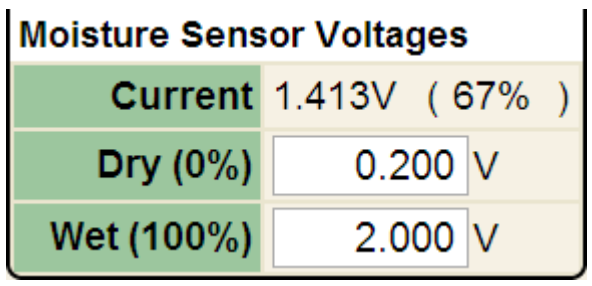
External Temperature



Field	Description
Temperature	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

Moisture

The moisture probe options box will only appear if the input 1 type has been selected under the configuration page.



Field	Description
Current	Current voltage being measured by sensors from the moisture probe.
Dry (0%)	Voltage when probe is completely dry.
Wet (100%)	Voltage when probe is completely wet.

Moisture Probe Calibration Procedure

For each Remote EpM sensor within a group that is to be used for moisutre measurement it is recommended to calibrate the probes before using them, this usually only needs to be done once for a probe.

- First make sure the probe is completely dry.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate. And navigate to the Moisture Sensor Voltages box, note this will only be visible if the Input 1 type has been set to Moisture on the configuration page.

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Current	0.123V (0%)
Dry (0%)	0.200 V
Wet (100%)	1.000 V

- Set the Dry setting value to match the current voltage being read from the sensor.

Current	0.123V (0%)
Dry (0%)	0.123 V
Wet (100%)	1.000 V

- Place the probe in to a glass of water, this is to ensure 100% wet of the probe for accurate calibration.
- Set the Wet setting value to match the current voltage being read from the sensor.

Current	1.393V (100%)
Dry (0%)	0.123 V
Wet (100%)	1.393 V

- Once these two settings have been enter, save and activate the settings to complete the calibration.
- Once completed the probe can be placed into desired media for normal operation.

Current	0.564V (35%)
Dry (0%)	0.123 V
Wet (100%)	1.393 V

Use Factory Defaults

Use Factory Defaults

Reset	Reset Now
Clear CC 1 Count	Clear Now
Clear CC 2 Count	Clear Now

Field	Description
Reset	Pressing this button will reset all calibration constants for Nutrient and pH. This button will not effect the offset and scale settings.
Clear CC 1 Count	Manually reset the contact closure count of Input 1 back to zero.
Clear CC 2 Count	Manually reset the contact closure count of Input 2 back to zero.

Averages

Averages

Tick Box to Add Reading to Average

Nutrient	2.71mS/cm^2 ☑
Nutrient Temp.	26.8°C ☑
pH	6.63 ☑
Ext. Temp.	21.6°C ☑
Moisture	67% ☑

This box lists all values that are supplied by a Remote EpM senosrs that can be averaged together. This will display variables even if they are not

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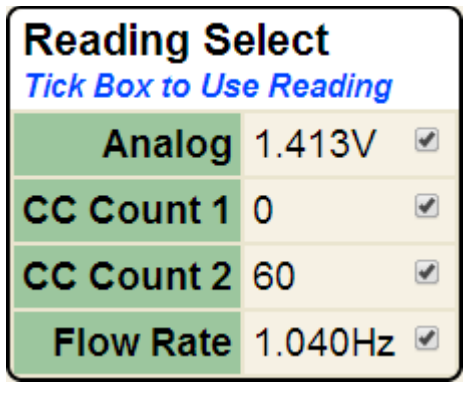
selected as an input on the configuration page.

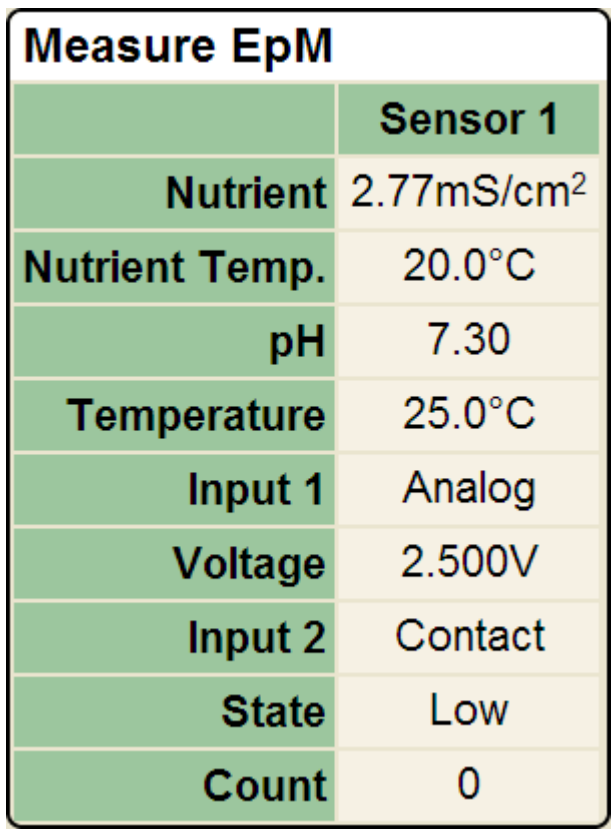
Reading Select



This box lists all values that are supplied by a Remote EpM senosrs that can be select to be used as the main reading out of the set. This will display variables even if they are not selected as an input on the configuration page.

Readings

EpM Sensor's



The above field displays the readings for every sensor within the Measure EpM group. All the readings from each sensor and each group are the same as pictured above, this includes the Check and Source EpM groups.

Field	Description
Nutrient	The current nutrient reading from the sensor if this is every 0.00mS/cm&sub2 check the probe. A reading this low should not be possible if the probe is in water. A reading of this suggest the probe is no longer submerged in water.
Nutrient Temp.	Current temperature of the water the probe is submerged in. Note due to the nature of the material the probe is made from the thermal conductance of the probe is rather low, this means a change in temperature of the water may take a while to effect the actual temperature displayed here.
pH	Current pH level of the water.
Temperature	The temperature of the Stainless steel External temperature probe wired into the sensor this will appear as XX if not connected or an error has occurred.
Input 1	What the current input wired into the Analog input pin of the sensor is, this will only effect what is displayed in the box below.
Voltage / Moisture / Count	Depending on how Input 1 is configure the variable here will be listed accordingly. *Voltage* Current voltage on the input pin. *Moisture* Current moisture in percentage based on the sensor settings. *Count* Current count of the input pin.
Input 2	What the current input wired into the CC input pin of the sensor is, this will only effect what is displayed in the box below.
Count / Flow	Depending on how Input 2 is configure the variable here will be listed accordingly. *Count* Current count of the input pin. *Flow* Current calculated flow rate based on the frequency being supplied by the input.

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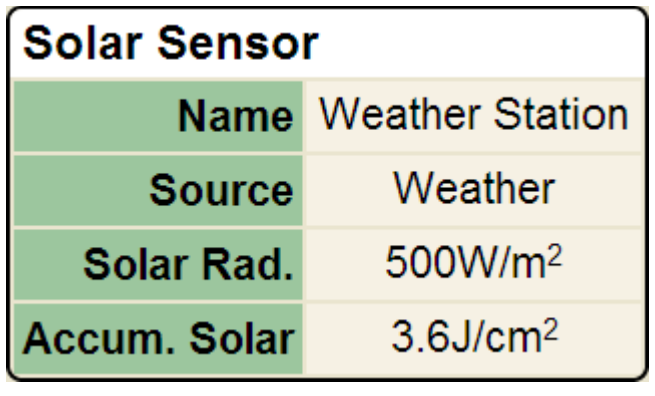
Solar Sensor



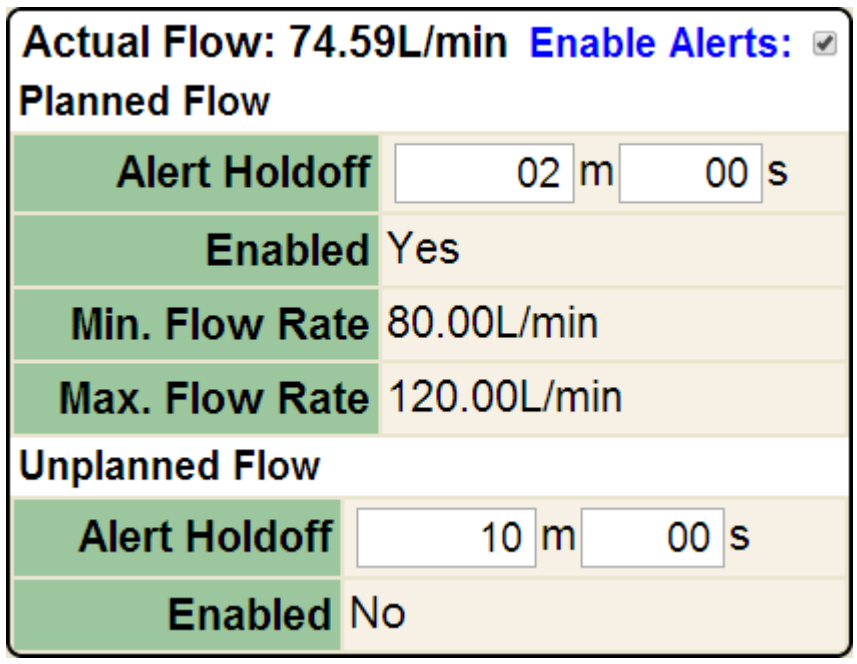
Field	Description
Name	Name given to the solar sensor this will vary depending on the source
Source	Current solar source configured on the system on the Configuration -> Sensors page.
Solar Rad.	Current solar radiation reading being measured from the sensor. If this is XX check the sensor is correctly configured.
Accum. Solar	Accumulated solar for the system based on the configured solar source, this is reset at the systems end of day.

Alarms

Flow Rate Alarms

If a flow meter is installed on a system the flow rate alarms can be configured under the water system tab. Here the currently active flow alarms will be displayed. An irrigation system has two flow rate alarms that become active under different conditions (Planned and Unplanned), it is no possible for both of these alarms to be active at the same time.

Planned



If the system has been set up for planned flow alarms these will be displayed here whenever flow is predicted on the system. The minimum and maximum flow calculated for the system are displayed here. If the flow goes outside of these bounds for the holdoff time an alarm will be generated. There are no warning for flow alarms they are always treated as alarm level events, depending on how the flow alarms have been configured it is possible that this alarm will stop the dosing or the whole irrigation system.

Unplanned

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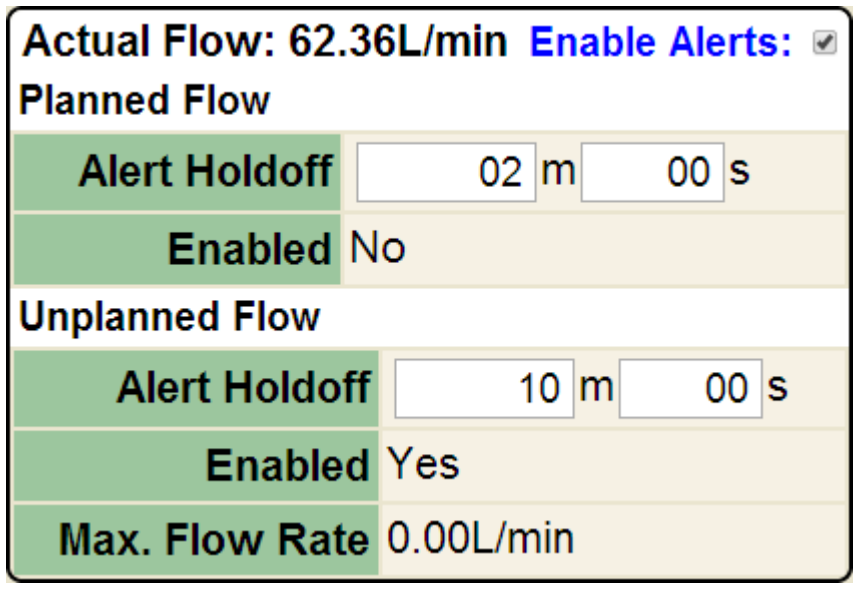


If the system has been set up for unplanned flow alarm it will be displayed here whenever no flow is predicted on the system. The maximum flow is a set level defined under the water system per time period and if the flow goes above this level for the holdoff time an alarm will be generated. There are no warning for flow alarms they are always treated as alarm level events.

Day Tank System

A day tank system is combination of a continuous dosing system and a straight watering system. The irrigation system is used to continuously dose a single supply tank with a set Program and Recipe for all plants within the system. It is then watered out using the watering functions of the system. This differs from other available system types within the MultiGrow because the watering and continuous parts of the system run completely independent of each other but are still located with a single system. The system can support up to 300 stations which can be logical arranged into 10 groups.

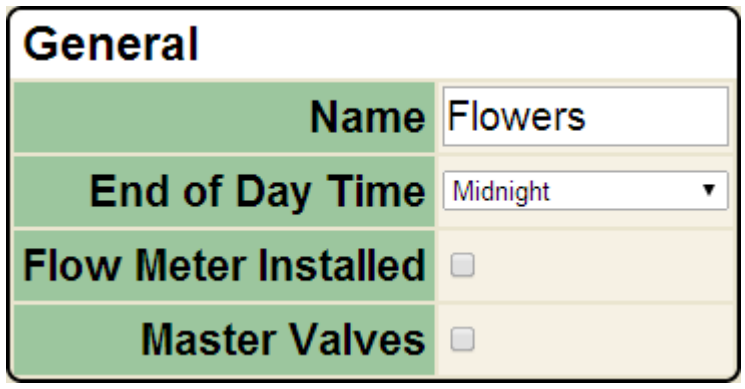
The system can have up to 10 recipes made of any mix of 10 different parts (A -> J) as well as pH correction in both directions raise or lower.

Filter backwash When set for filter back flushing, the controller will flush the filter within a set window or when a pressure build up is detected. If an irrigation is triggered during a backflush, the flushing will complete and then immediately switch to irrigation.

Suggested Layouts

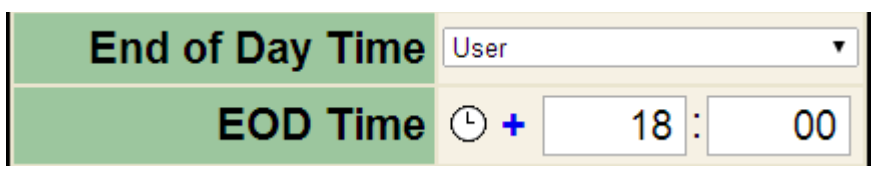
General

Each system has a number of generalized settings which can be found on the top tab settings or configuration page labelled as General, and the status tab on the readings page. These areas are used to display the current general information for the system and any generalized setting or configuration options which are not specific to a particular component within the system.



Name: Name for the current system, this is the same setting as found on the summary page.

End of Day Time: An Irrigation system has a few different readings which need to reset daily, this option allows you to select whether these variables are reset at Midnight local time or at a specific time of the day.



EOD Time: If the End of Day Time has been set to User this option will become available. Here a specific time of day can be used to reset specific readings.

Flow meter Installed: If the system has a flow meter installed that is used to measure the irrigation flow this box needs to be ticked.

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Flow Meter Installed	☑
Litres Per Pulse	1.00 L
Actual Flow	0.00L/min

Litres Per Pulse: This setting box is only displayed once the Flow meter Installed box has been ticked. Here the flow rate of the installed meter must be specified, this value should be specified by the manufacturer of the flow meter.

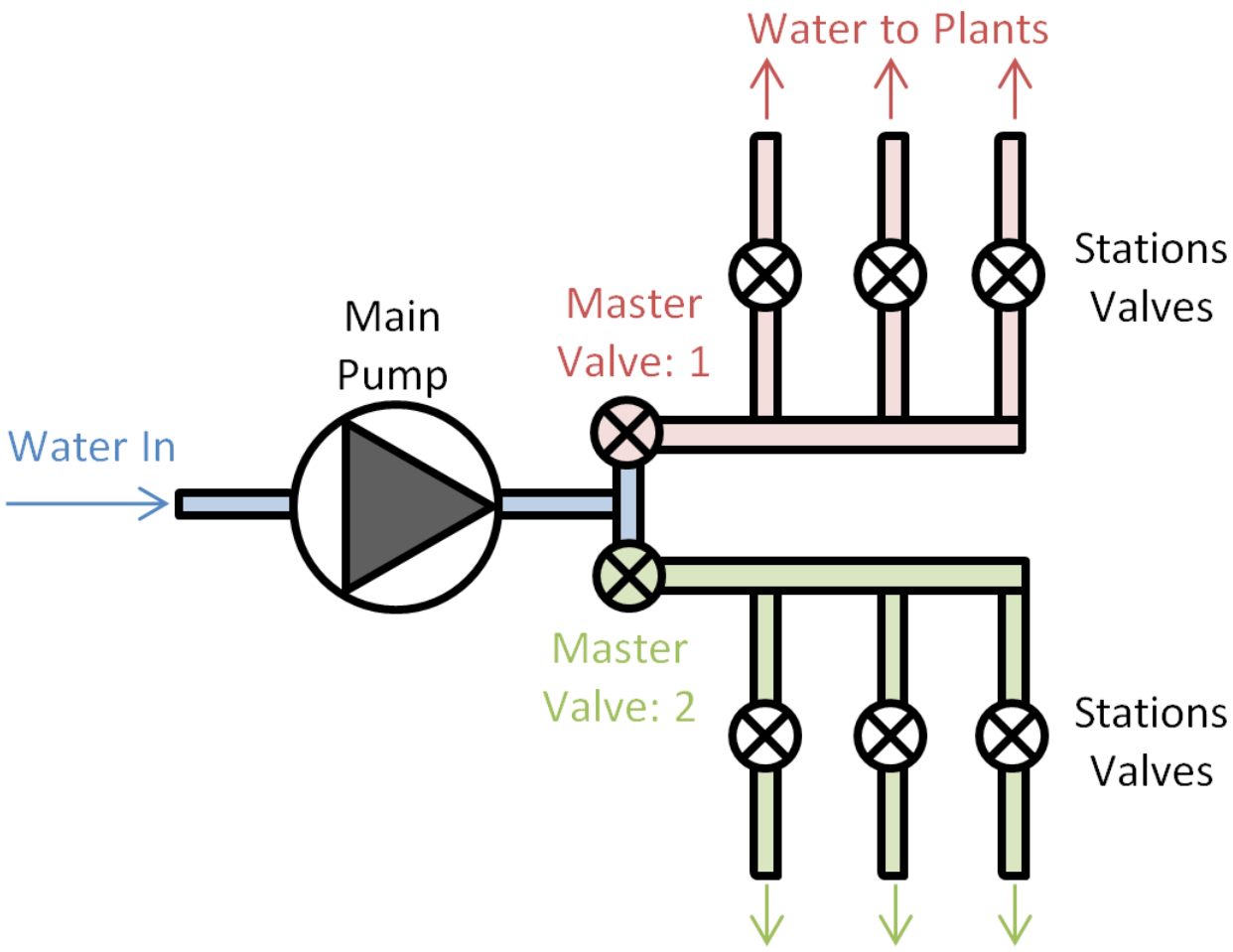
Actual Flow: This is the current flow rate being measured by the system.

> A Remote EpM sensor must be configured in the system before this reading will display correctly

Master Valves: If the system has master valves this box needs to be ticked in order to configure them. This option is not available on a continuous type system, master valves can only be installed on systems that control the watering side of the irrigation.

Master Valves

A master valve is used if the system has multiple pipes going for a single irrigation source to different crops. They physically separate the pipe lines for different stations (zones).



Adding a Master Valve

Master Valves
⊕ Add new

Pressing the add new button will add a new master valve into the irrigation system, once a new valve is installed it can be configured.

Master Valves	
⊕ Add new	Valve 1 ✖
Line Num.	1 ▾
Output	0 . 0

Line Num.: This is a logical line number associated with a certain master valve, this number is used when assigning Stations (zones) to a line.

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Output: Address of the output expander this master valve is wired to, see section blah configuring a single output for more information.

Time Periods

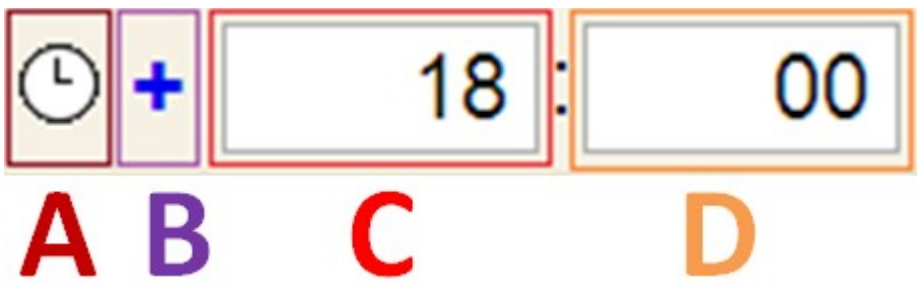
Time periods for the system can be defined here, up to 5 time periods can be supported by each component within a manager. can be defined as a time of day, offset from sunrise or offset from sunset. The name of the time period is not important for control but very useful when configuring time period dependent variables. Whenever one of these variables is displayed in the system it will appear within a list of all configured time periods so is very important to make the names of each time period something to help identify. Useful names could be the times of day (7am-10am), solar events (Sunrise, Noon), specific time period purposes (Heat trap, RH purge), Times of the day name (Dawn, Morning) or any other useful identifier.

Name: Specify unique name for this time period.

Start Time: Specify the start time for this time period.

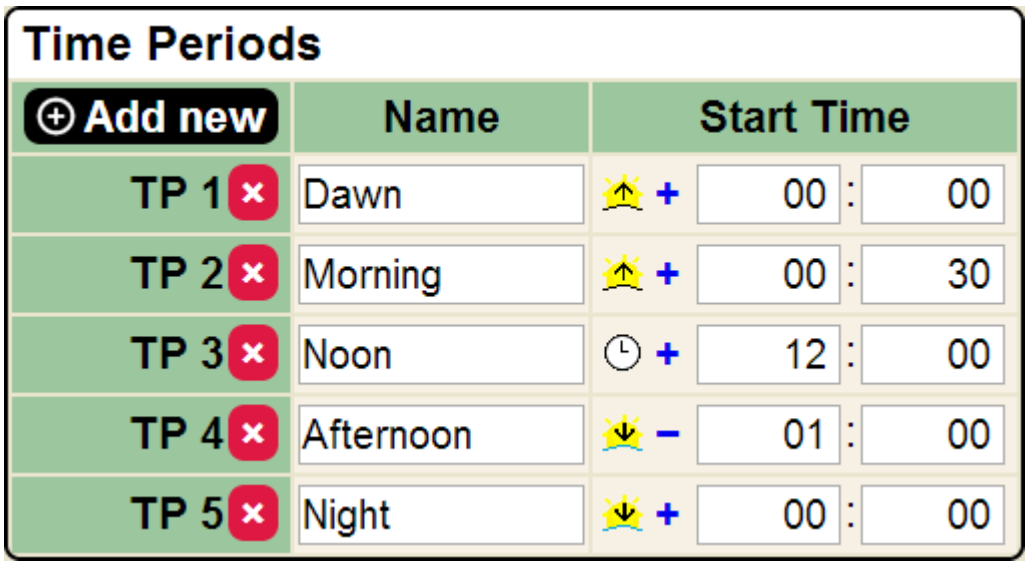
Configuring a Time of Day variable

A time of day variable are used through out the Multigrow system they are variables that will cause a specific event to happen at a specified time.



- **Setting A:** Specifies what the entered time is relevant to.
  - Selecting this icon means that the specified time is an offset from sun rise.
  - Selecting this icon means that the specified time is an offset from sun set.
  - Selecting this icon means that the specified time is a positvie offset from midnight, this is the same format as standard 24 hour time, 07 00 = 7 hour offset from midnight (7am), 19 00 = 19 hour offset from midnight (7pm).
- **Setting B:** States whether the offset being applied is positive or negative to the time specified. Note, when using a normal time this will be positively applied regardless of the setting.
  - The time specified is a positive offset from the first setting.
  - The time specified is a negative offset from the first setting.
- **Setting C:** The offset time hours are specified here.
- **Setting D:** The offset time minutes are specified here.

Using time periods



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Each time period is active from the time specified within the box until the time of the next period. In the above configuration you can see a combination of various types of time periods.

If we take Sunrise to be 7:00am and Sunset to be 5:30pm, the time periods for the day work out to be;

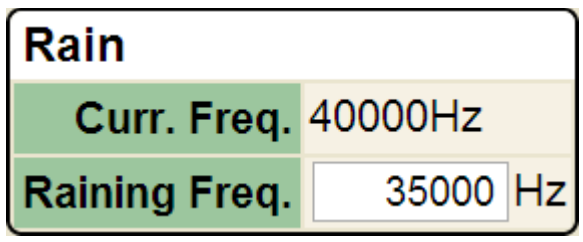
Time Period	Name	Start	Stop
1	Dawn	7:00am	7:30am
2	Morning	7:30am	12:00pm
3	Noon	12:00pm	4:30pm
4	Afernoon	4:30pm	5:30pm
5	Night	5:30pm	7:00am

Settings

Time Periods

The first box visible on this page is used to configure the time periods of the system. These settings are identical to the one found on the configuration page, please refer the configuration section above for more information on this settings box.

Rain

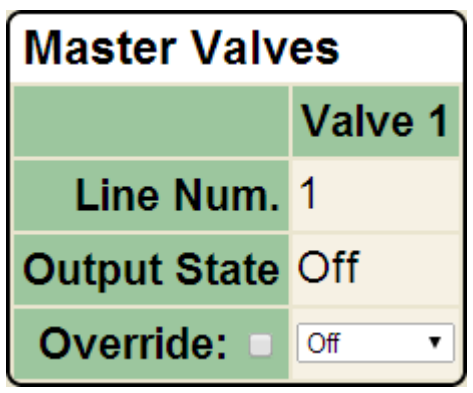


An irrigation system can use rain to reset certain triggers within a system, here the setting for this can be modified. Note a weather station is used to supply the status of the rain to the system and must be properly configured for this functionality to work correctly.

Curr. Freq.: Current frequency being measured by the weather station.

Raining Freq.: Frequency in which this particular irrigation system deems it to be raining.

Master Valves



Master valves have only one setting which can be found within this box they can only be overriden to a set level.

Line Num.: The line number assigned to the master valve.

Output State: Current state of the master valve output.

Override: Ticking this box will software override the output to the state specified in the drop down box.

Cannot include /irrigation/day_tank/day_tank_status - does not exist yet

Groups

A group is a logical collect of stations (Zones) within an irrigation system. These maybe similar plants (Tomatoes, Flowers) Perhaps a where things are physically located (Compartment 1, Outside Crop) or collection of drippers (Bed 1, Bed 2). Each group can have various triggers source such as solar, time of day,. A group can also be manual triggered. In system such as Inline and Batch a Program and Recipe can be assigned to each groups so watering of different groups can have varying Nutrient and pH targets as well as differing recipe mixes.

Example here:

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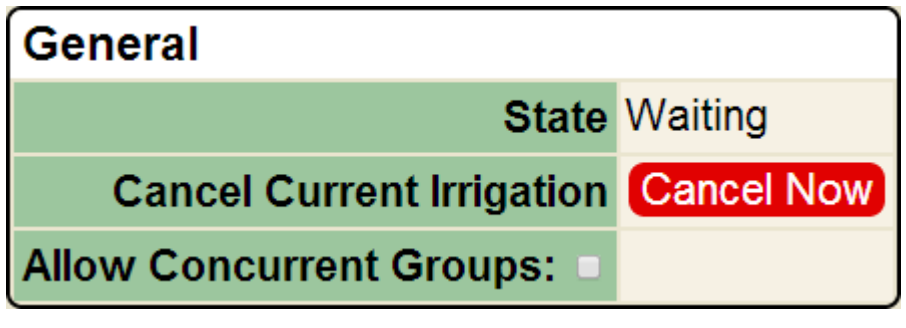
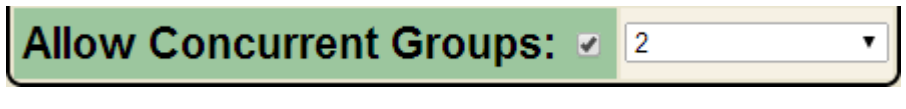
Settings

General



State: Current state of the irrigation system

Cancel Current Irrigation: Pressing the cancel now button will immediately cacncel all current active irrigation's. Note that pending irrigation's may start after this.

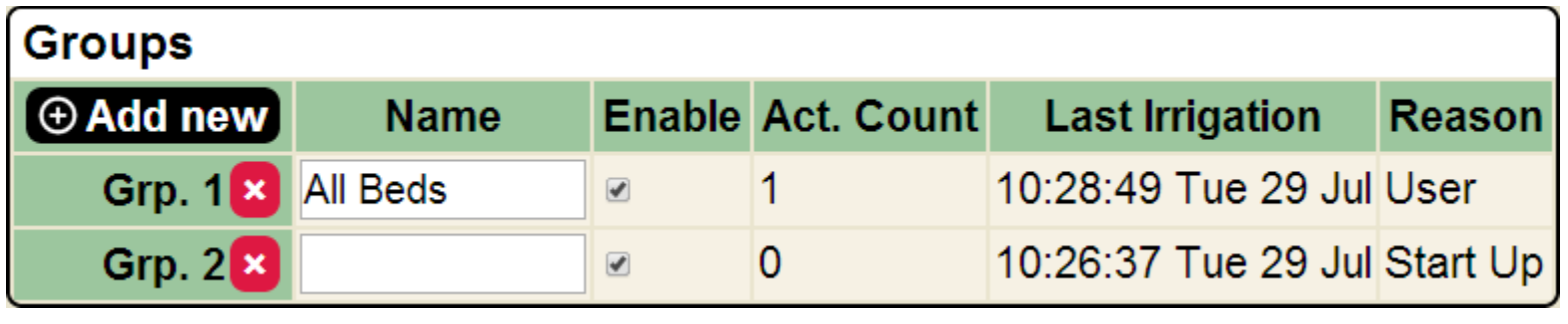


Allow Concurrent Groups: This setting allows more than one group to operate simultaneously on the system. This should only be used if an adequately sized pump has been installed. In the case of inline injection or batch dosing using this setting will mean all groups must run using the same program and recipe as all water is passed through the same dosing system. Ticking the box will reveal a drop down box where the number of groups can be specified. This number is a maximum number of groups that can be on at the same time.

Enable Post Fill Dosing: This option is only available on a batch system, this will enable the batch tank to dose while doing a post fill. This will however restrict the system to a single program and recipe, which will be used for post fill dosing as well as normal dosing when a group is triggered.

Groups

Groups can be added to the system by the use of the add new button in the groups box on the group tab.



Name: A unique name should be given to each group in order to better identify it within the system this name has no effect on the control. Once a group is added and name it will appear along the tab menu for groups under the name given. Note if the name field is left empty it will be identified using the number of the group.

Enable: This box must be ticked if this group is going to be active. A group might have various triggers configured and needs to be disabled unticking this box will stop the group from running without having to disable the trigger set up on the group.

Act. Count: How many times the group has been active today, this variable is reset at the end of day time.

Last Irrigation: The last time the group was irrigated. Note if the controller is reset all groups will have the same time until triggered. Also if a new group is added the time will be set to the time it was activated.

Reason: The reason why the last irrigation happened, this is the trigger cause of the group. Even if the group is cancelled right away this will still be updated. Note that if the system is reset all groups will have start up as the reason. If a group has start up as the reason it has not run since the last time the controller was power cycled. This is also the default reason used when a group is created.

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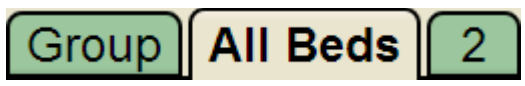
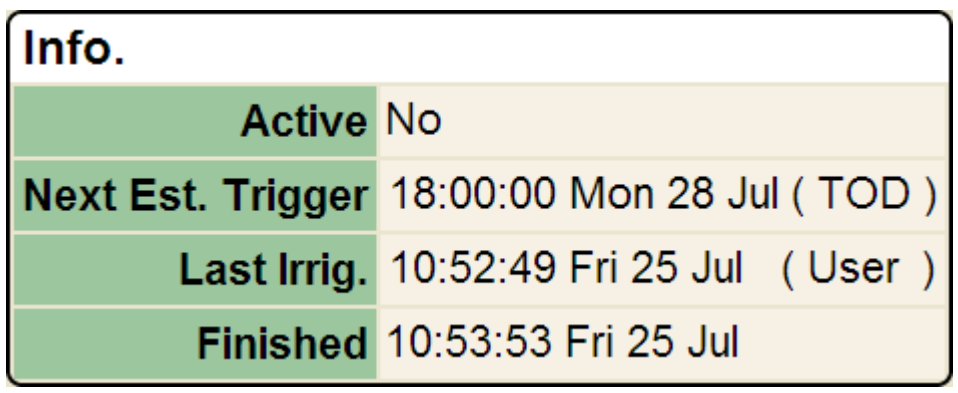
Group



By navigating to the name of the group on the groups tab menu each groups individual settings can be accessed.

Stations

The stations tab is where individual stations can be added to the group a manual action button are also located here as well as general information about the group.



The Info. box contains all relevant information about the group and it's last irrigation.

Active: This variable is used to indicate if this group is currently being water by the system.

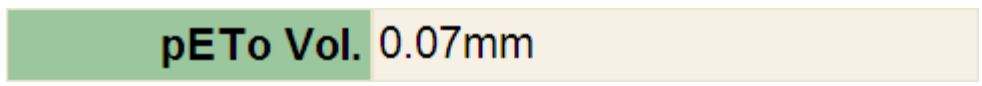
Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

Last Irrig.: The time of the last irrigation trigger for the group and the reason it happened.

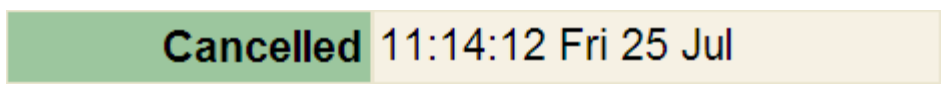
Finished: The time the group finished it last watering.

Additional Information

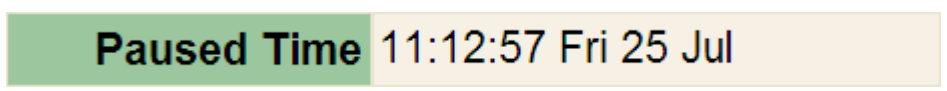
Depending on how the irrigation went or configured triggers the information box can contain additional fields.



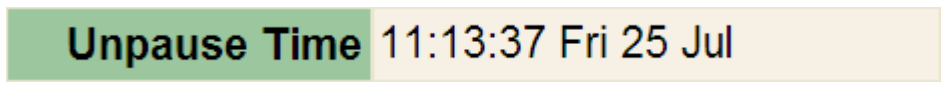
If the group has been configured to use pETo triggers the current volume of this will be displayed in the Info. box. Note that pETo triggers are complicated and should not be used without a full understanding of the Evapotranspration model.



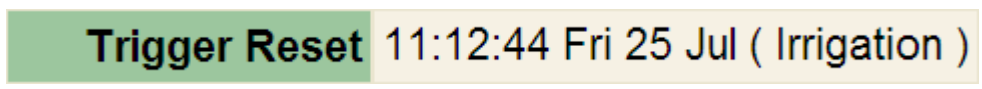
If the group was cancelled this reading will be displayed with the time this occurred, since a cancel is a user only event no reason will be given for this.



If a group was paused while it was watering the time at which this happened will be displayed in the Info. box.



When the group was unpaused the time at which this happened will be displayed in the Info. box.



If the group is configured to have periodic triggers the reading which drive these are reset whenever a group is triggered. The reset source can be because the group was irrigated or manual reset. The time at which this happened will be displayed as well as the reason.

Action

The action box is a quick way to trigger an irrigation on a group from the stations page. Pressing the Irrigate now button will cause an immediate

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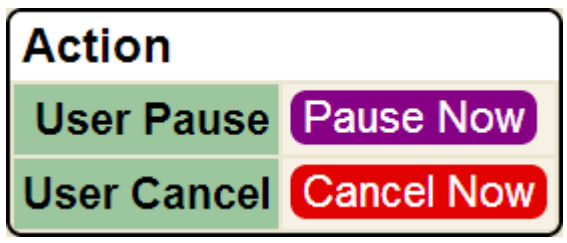
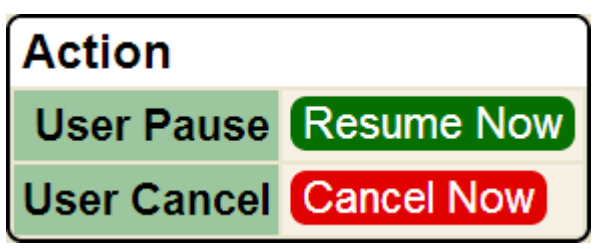
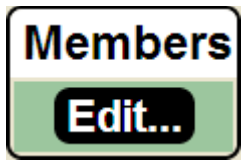
trigger. Note depending on how the system is configured and what may already be running the group may not actually start irrigating straight away, a trigger will however be queued for this group.

Once triggered the action box will change to enable you to either pause/resume a group or cancel this group.

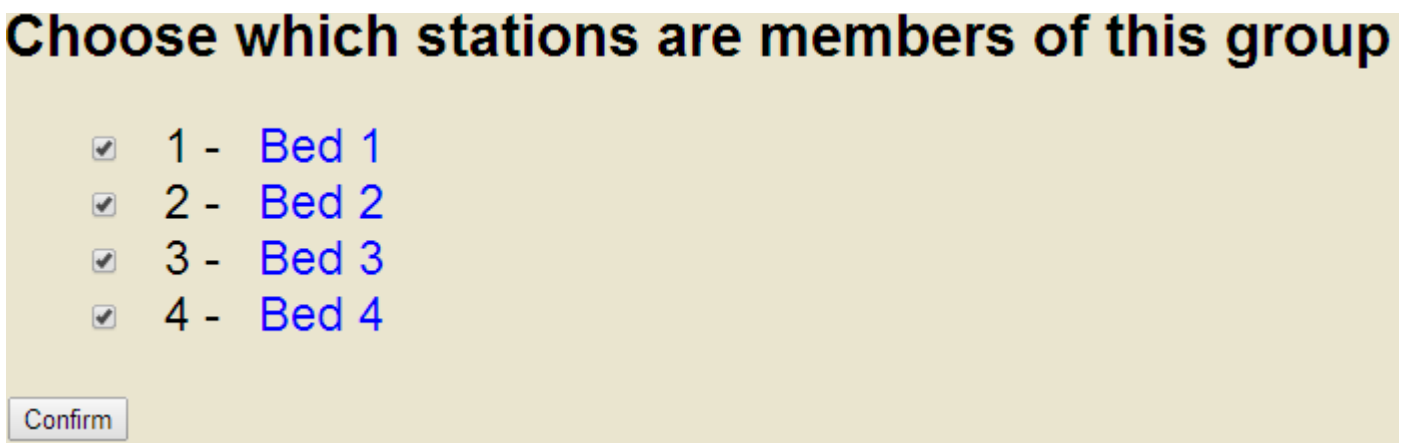




Members

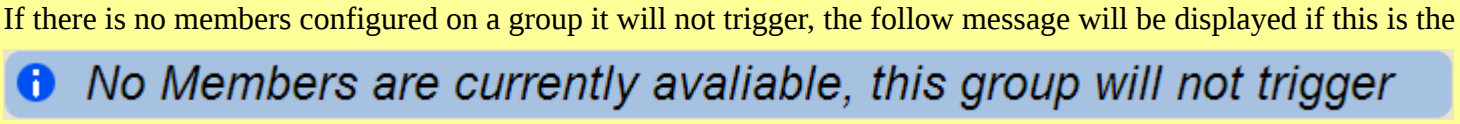


Each group can have up to X amount of members configured. A member is a station (zone) assigned to a group. Pressing the Edit.. button will bring up the members selection page.

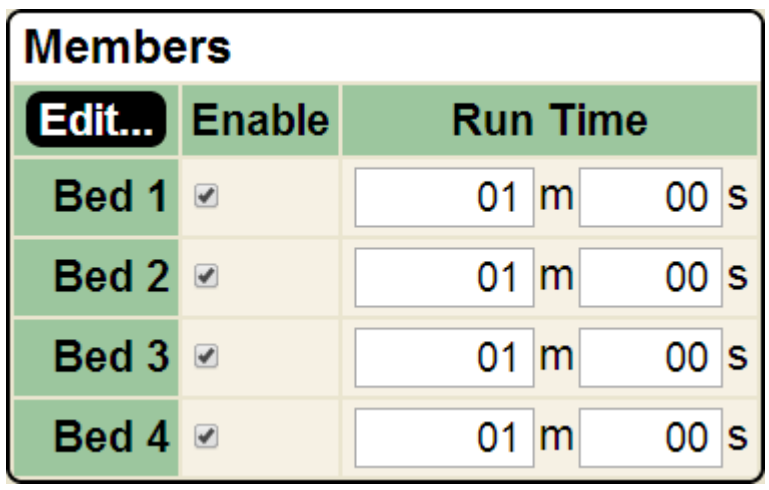


Here placing a tick box beside the desired station will add it to this group. The blue field is the name that has been given to the station underneath the configuration page if this is blank the number represents the number of the station. Once all members have been selected press the confirm button to return to the previous page.

If there is no members configured on a group it will not trigger, the follow message will be displayed if this is the case.



Once members have been added to the group and activative this error message will disappear.



Enable: Though a stations is added to a group it may need to be disabled for a period of time. Unticking the enable box will stop this group being watered when this group is triggered.

Run Time: The time the stations will be watered for this is set per member per group so each stations run time can be varied simply by the run time specified in the member.

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If a station is not enabled under the station configuration page, it cannot be run under any group. It can still be selected as a member but the following box will be displayed.

Bed 4		Disabled in Configuration

The stations must be enabled in order to water this station.

Start Delayed Groups

Members

Edit...	Enable	Start Delay	Run Time
Bed 1	☑	00 m 00 s	01 m 00 s
Bed 2	☑	00 m 00 s	01 m 00 s
Bed 3	☑	00 m 00 s	01 m 00 s
Bed 4	☑	00 m 00 s	01 m 00 s

If group has been setup to ignore the capacity check under the Group->Settings tab then each station will run regardless of if the system capacity is exceeded. This can cause problems if the pump isn't big enough to handle this so a start delay can be used to offset stations to ensure that stations that will run together that will exceed capacity. Note start delays only make sense if multiple stations are being run at once or concurrent groups are running simultaneously.

pETo Run Times

Members

Edit...	Enable	Type	Run Time	Active
Bed 1	☑	Time	01 m 00 s	1m 0s
Bed 2	☑	Volume	01 m 00 s / 1.0mm	0m 7s
Bed 3	☑	Crop Coeff	0.50	0m 3s
Bed 4		Disabled in Configuration		

If a group is set up as a pETo group the run time for each station can be varied based on how much volume of ETo the group has measured.

Enable: The enable setting remains that same as a normal.

Type: Here the type of run time can be specified for each member of the group.

- **Time:** This is a straight forward time and will always run at the station for this length.
- **Volume:** This will modify the stations run time based of the current pETo volume.
- **Crop Coeff:** The run time will be modified based on the pETo run time specified for the station under the configuration.

Run Time:

- *Time:* If the Type is configured as a time the run time setting is a simple time.
- *Volume:* The Run Time will be modified based of the current pETo volume being measured. In the example the current run time will be 1 Minute for every 1.0mm volume measured.
- *Crop Coeff:* The crop Coefficient type means that as the crop changes the run time needs to be modified. The pETo run time is consistent so is configured as a stations based setting on the configuration page and the members modify the effect of this. If the stations pETo run time is configured as 1 Minute per 1.0mm and the Crop Coefficient as 0.50 then at actual effective pETo effect is 1 Minute per 2.0mm

If a Coefficeint type run time is going to be used the pETo Stations enable setting on the configuration page must be enabled if this is not the station will be given a run time of 0m00s and this error message will be displayed.

Bed 3	☑	Crop Coeff	*pETo Stations Disabled*	0m 0s

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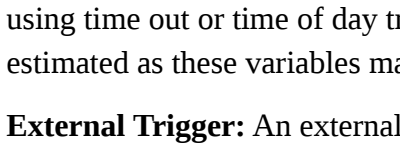
Active: Current run time the station will be assigned if triggered.

Program

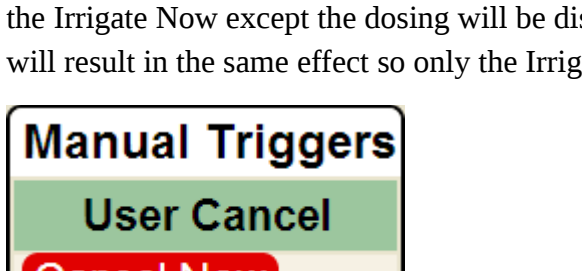


Programs can be individually assigned to each group within an Inline or Batching system, depending on how a system is configured. If the system is an inline system and is set up for concurrent groups a single program is given for the system rather than per group as this doesn't make sense if multiple groups can run simultaneously. This is similar to the post fill dosing option for a batch system where the tank will already be pre-batched with a certain program and recipe so all groups must use the same one. For information about how to configure a program please see the section on Programs later on in the manual.

Triggers / Automatic

The trigger tab will appear as Automatic if the group is configured as manual. Here is where all none periodic triggers are configured.

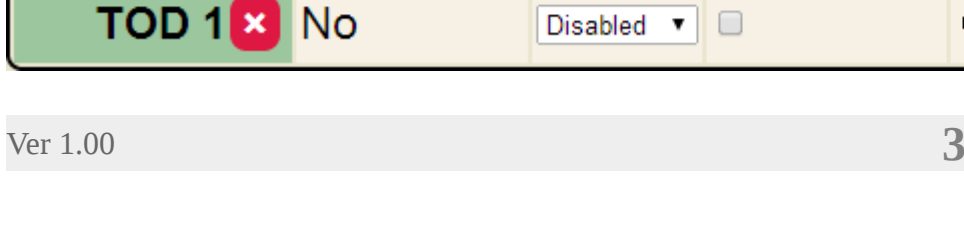
General



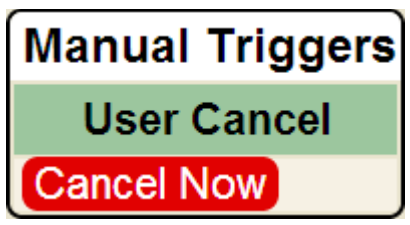
Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

External Trigger: An external trigger is a contact closure input wired into an Remote EpM module under the CC input pin or the Moist input on connector B. When this input is pulled the appropriate level by the use of a contact an irrigation is triggered. This can be used with the wall mounted button for example.

Manual Triggers

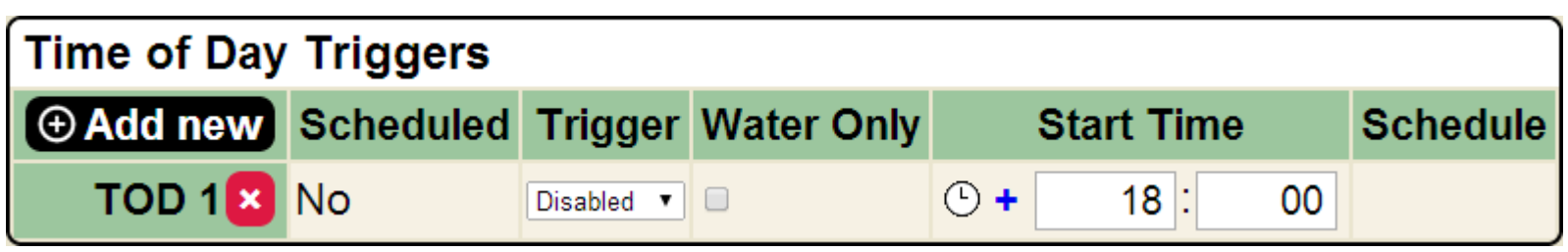


The action box is a quick way to trigger an irrigation for a group. Pressing the Irrigate now button will cause an immediate trigger. Note depending on how the system is configured and what may already be running the group may not actually start irrigating straight away, a trigger will however be queued for this group. A inline or batching system also has the ability for a water only trigger, pressing the Water Now button has the same effect as a the Irrigate Now except the dosing will be disabled for this group. If the system is a watering system the Irrigate Now button and the Water Now button will result in the same effect so only the Irrigate Now button is viable on this type of system.



Once triggered the action box will change to enable you to either pause/resume a group or cancel this group.

Time of Day Triggers (TOD's)



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A Time of day trigger sometimes referred to as TOD is an automatic triggers that will happen at the same time everyday. This will depending on other settings such as days of the week enables and if the trigger is scheduled. Each group can have up to 8 Time of Day triggers.

Scheduled: Is this Time of Day currently scheduled. Note Automatic triggers are always scheduled unless the day of the week is disabled under settings.

Trigger: What kind of trigger this time of day uses.

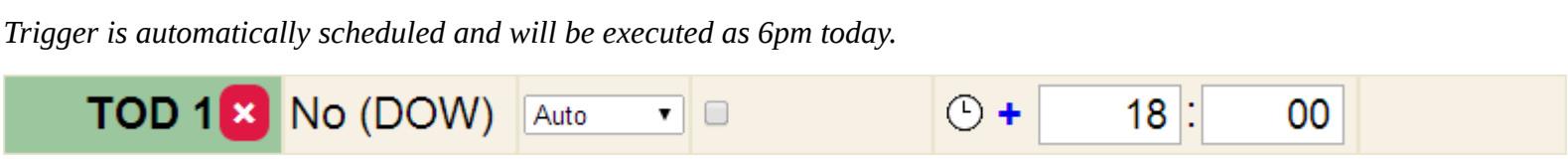
- ***Disabled:*** Time of day trigger is currently disabled.
- ***Auto:*** Time of day trigger will happen everyday that is allowed to trigger on.
- ***Manual:*** The time of day trigger will only be trigger once then will need to be re-scheduled in order to trigger again.

Water Only: The Time of Day trigger will trigger a water only irrigation for the group.

Start Time: The time at which this particular trigger will start at.

Schedule: If a manual Time of day trigger is being used a Now button or Cancel button will appear in this box.

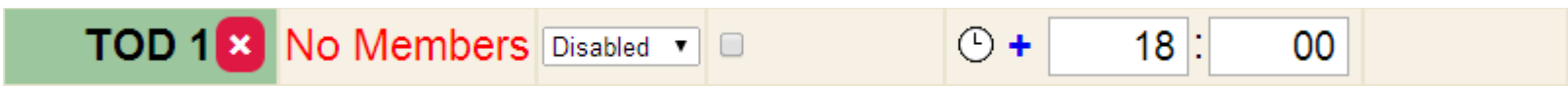
Trigger is automatically scheduled and will be executed as 6pm today.



Trigger is automatically scheduled but will not run today at 6pm because the group is not allowed to trigger today this is shown by the (DOW) next to the No.

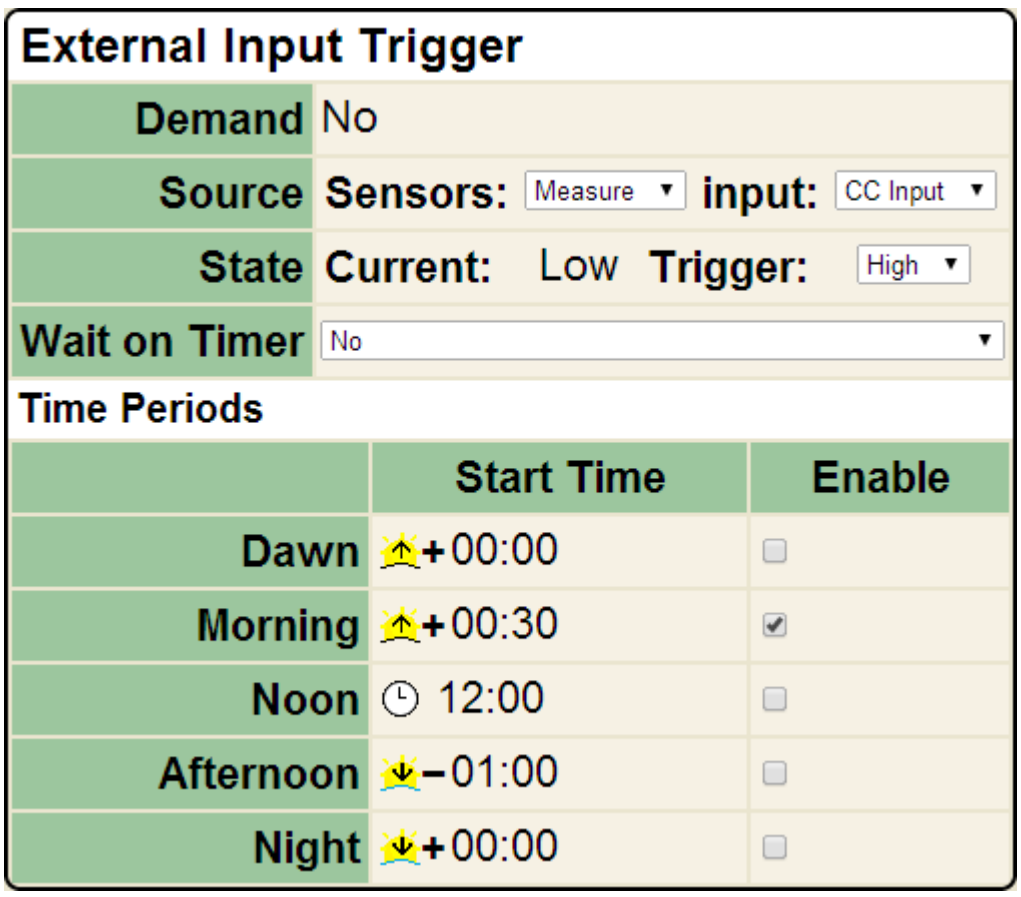
Trigger is manually scheduled and has not been set to execute today.

Trigger is manually scheduled and has been set to execute today at 6pm.



The current group does not have any members assigned to it, this means it is unable to trigger and will not execute this trigger.

External Input Trigger



Demand: Is an external input trigger demand, once this trigger has been processed this demand will be cleared however the group may not of started irrigating yet. If the trigger is not enabled during this time period the system will

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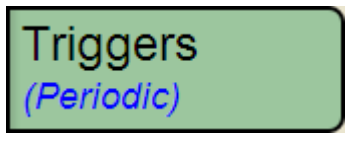
Source: Defines exactly where the input is coming from, this trigger can be activated from any of the three local system sensors. And can be from either the CC input pun or Analog input pin of the device. Note that the appropriate Use Me var must be configured under the sensor setting for the group to ensure that the system

State: List the current state of output as well as the level needed to on the input to action this trigger.

Wait on Timer: If a periodic minimum time out is being used under the group periodic triggers the external input trigger can be configured to obey this. Setting this field to yes means and external trigger cannot be processed until the minimum time out has been reached.

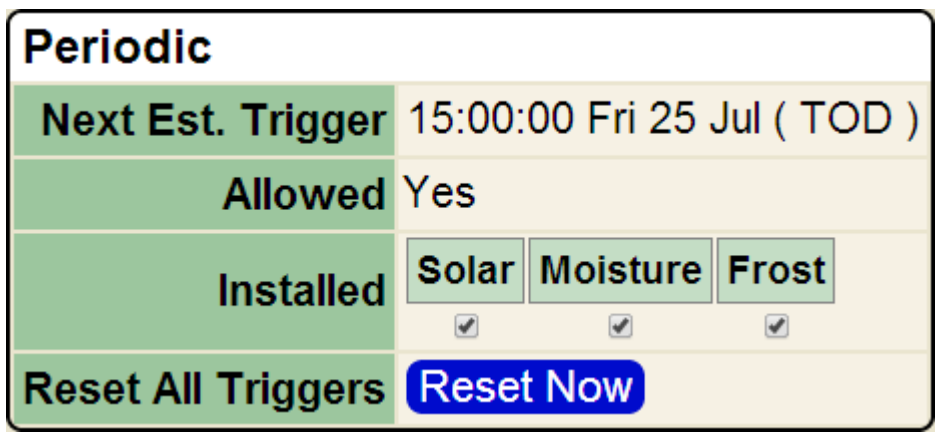
Enable: The trigger can be enabled to only allow triggers within certain time periods.

Periodic Triggers



Each group can have periodic triggers enabled under the settings tab, when this is set an additional tab will be displayed in order to configure them. A periodic trigger is something that is deemed to happen multiple times a day, a certain temperature has been reached, a certain amount of solar has been received.

Periodic

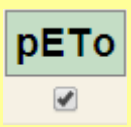


Next Est. Trigger: What is the next trigger the system estimates will be actioned on this group and at what time this will occur. If the group is only using time out or time of day triggers this estimation is accurate, if periodic trigger based on solar, moisture, temperature are used these can only be estimated as these variables may change in a non-uniform way.

Allowed: Is a periodic trigger allowed, this is controlled by the Minimum timer function of the periodic triggers if this is disabled or the time has expired this reading will say Yes, otherwise the time remaining will be displayed.

Installed: The Multigrow system supports up to 3 different periodic trigger sources with the option of adding a four if configured in a certain way. Ticking and activating these boxes will reveal separate settings boxes in which each of these can be configured.

A additional periodic trigger can be installed in the system if a pETo group is being used. The additional box shown below will be displayed if this option is available.



Reset All Triggers: Pressing the reset now button will make it seem like a trigger has occurred to the periodic counters installed on the system. This can be useful when delaying but not completely stopping periodic triggers.

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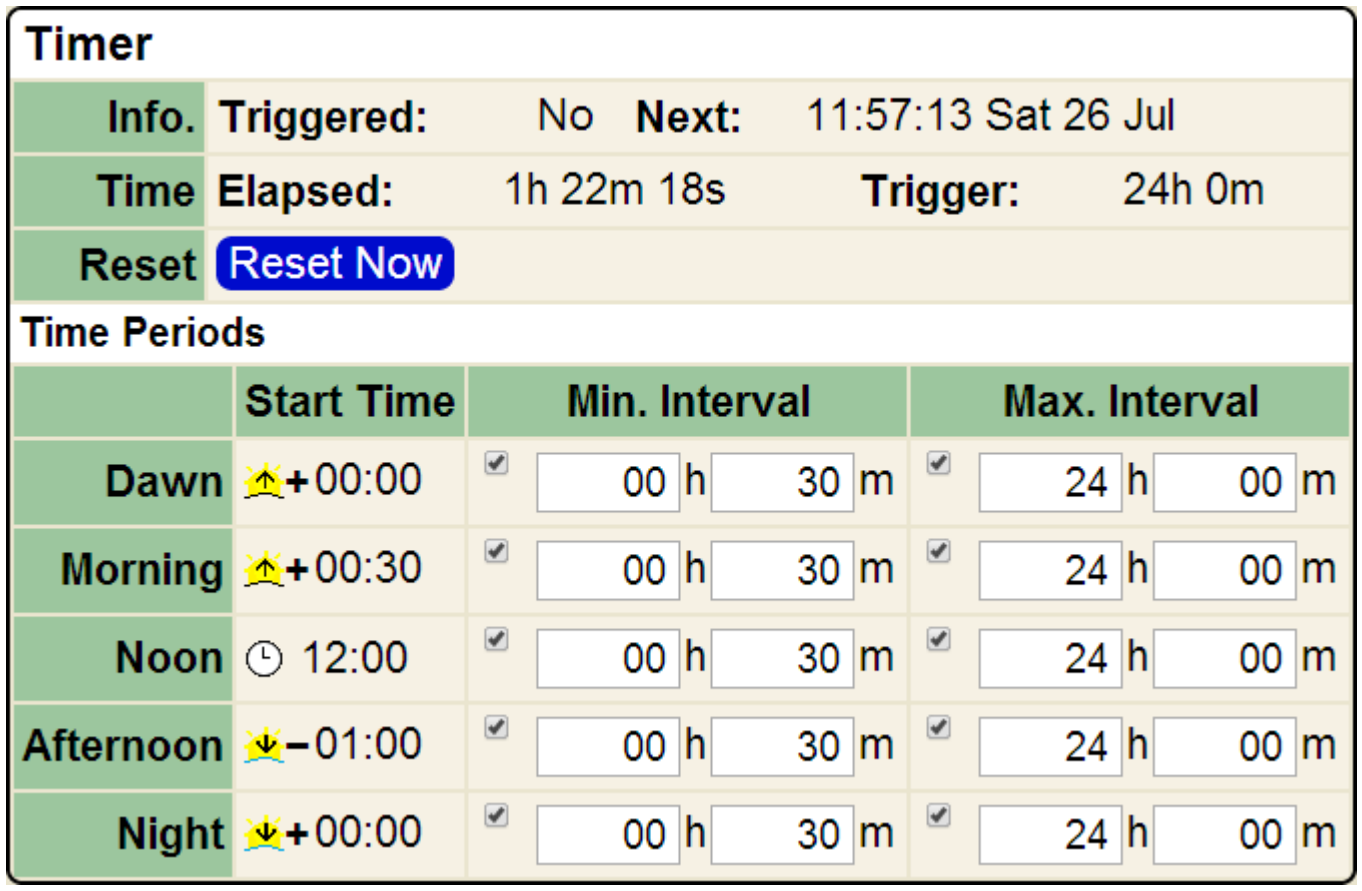
Timer


Timer
Info. Triggered: No Next: 11:57:13 Sat 26 Jul
Time Elapsed: 1h 22m 18s Trigger: 24h 0m
Reset Reset Now
Time Periods
Start Time
Min. Interval
Max. Interval
Dawn +00:00 00 h 30 m 24 h 00 m
Morning +00:30 00 h 30 m 24 h 00 m
Noon 12:00 00 h 30 m 24 h 00 m
Afternoon −01:00 00 h 30 m 24 h 00 m
Night +00:00 00 h 30 m 24 h 00 m

The periodic timer lets you specify a minimum time between irrigation as well as a maximum time for each group in the system. Note that if a minimum time is set all other periodic triggers are held off by this. Time of Days and manual triggers ignore this setting.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the Max interval is disabled there will be no next trigger predicted.

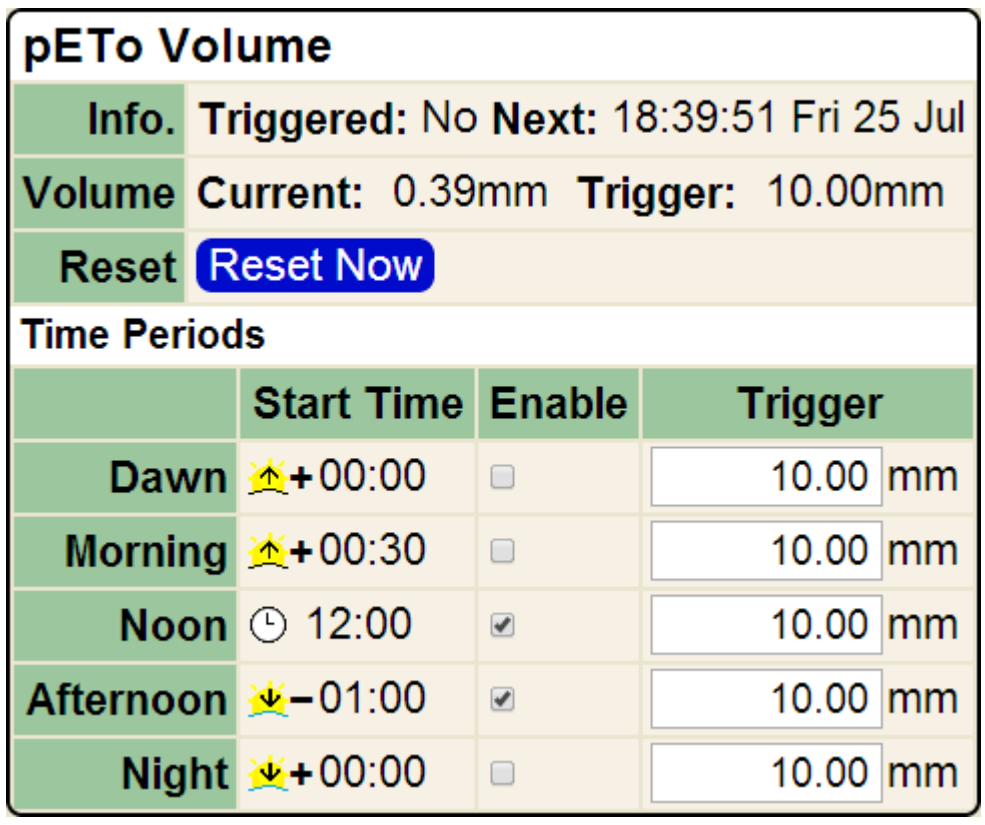
Time: Current time that has elapsed since the last trigger for the group. This will be since any trigger not a just a time trigger. Trigger time for the timer, if a max interval timer is disable for the time period this will be left blank.

Reset: Pressing the reset now button will clear the elapsed time back to zero, this will cause the periodic triggers to wait the minimum time again as well as push back the max time out trigger. This is to hold off periodic triggers.

Min. Interval: Each time period has it's own minimum time out settings for greater control. Ticking the Min. Interval tick box will reveal a time box field where the hour and minutes of the minimum interval can be set. Once the elapsed time exceeds this value periodic triggers are allowed to execute.

Max. Interval: Each time period has it's own maximum time out settings for greater control. Ticking the Max. Interval tick box will reveal a time box field where the hour and minutes of the maximum interval can be set. Once the elapsed time exceeds this value a Time Out trigger will be executed.

pETo Volume



If a group is configured to use pETo Volume the trigger can be configured here. Each group within the system can have a different pETo trigger. The pETo volume accumulator needs to be properly configured in order for this trigger to work, please refer to the pETo configuration section below for

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more information on this.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

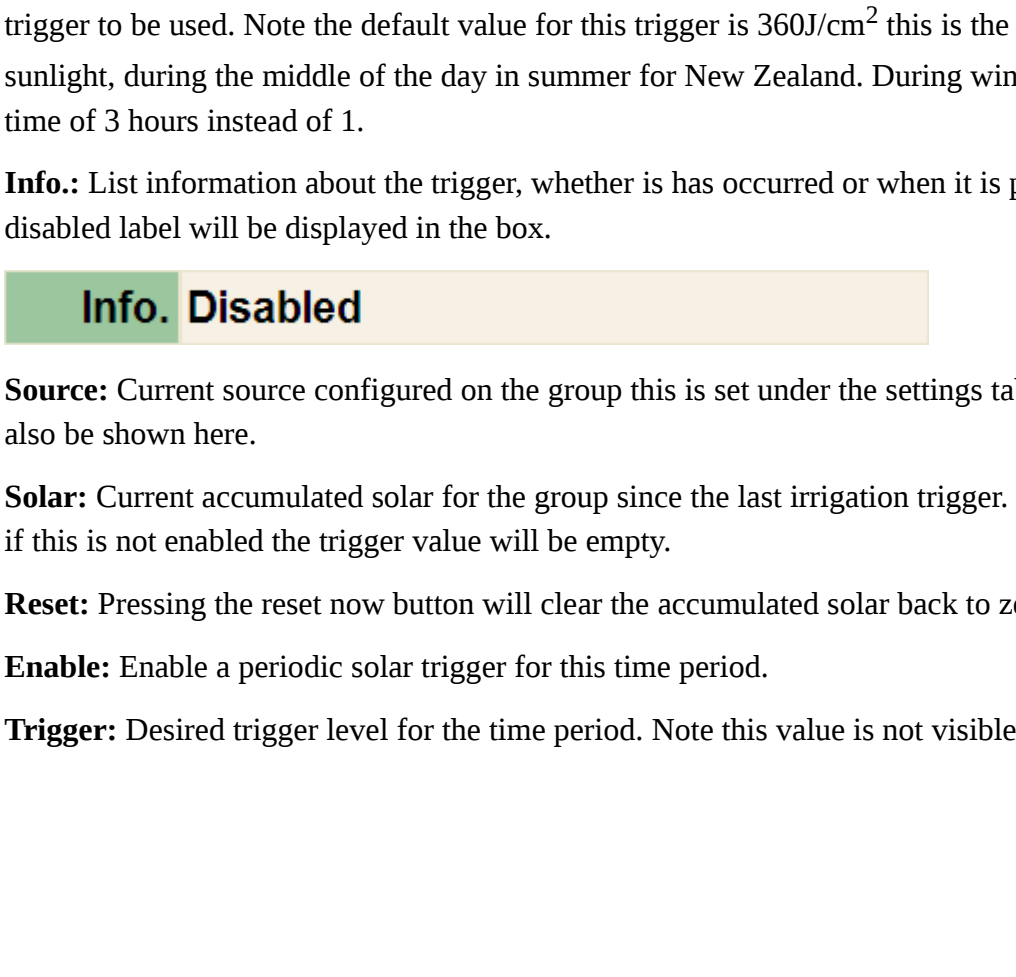
Volume: The current accumulated volume being measured by the group and the current trigger level are displayed here. If the trigger is not enabled the this time period the trigger value will be empty.

Reset: Pressing the reset now button will clear the accumulated volume back to zero.

Enable: Enable a pETo accumulated volume trigger for this time period.

Trigger: Desired trigger level for the time period. Note this value is not visible until the enable is saved.

Solar



A solar trigger lets you specify a accumulated solar level in which the group will be irrigated at, for each group in the system. Note that if a minimum time is set all this triggers will be held off until this time elapses. A valid solar source also needs to be available and configured for the group for this trigger to be used. Note the default value for this trigger is 360J/cm^2 this is the average amount of solar radiation accumulated over 1 hour of direct sunlight, during the middle of the day in summer for New Zealand. During winter this number is usually about a third of this 120J/cm^2, or a trigger time of 3 hours instead of 1.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

Source: Current source configured on the group this is set under the settings tab for each group. The current solar radiation value of this source will also be shown here.

Solar: Current accumulated solar for the group since the last irrigation trigger. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Reset: Pressing the reset now button will clear the accumulated solar back to zero.

Enable: Enable a periodic solar trigger for this time period.

Trigger: Desired trigger level for the time period. Note this value is not visible until the enable is saved.

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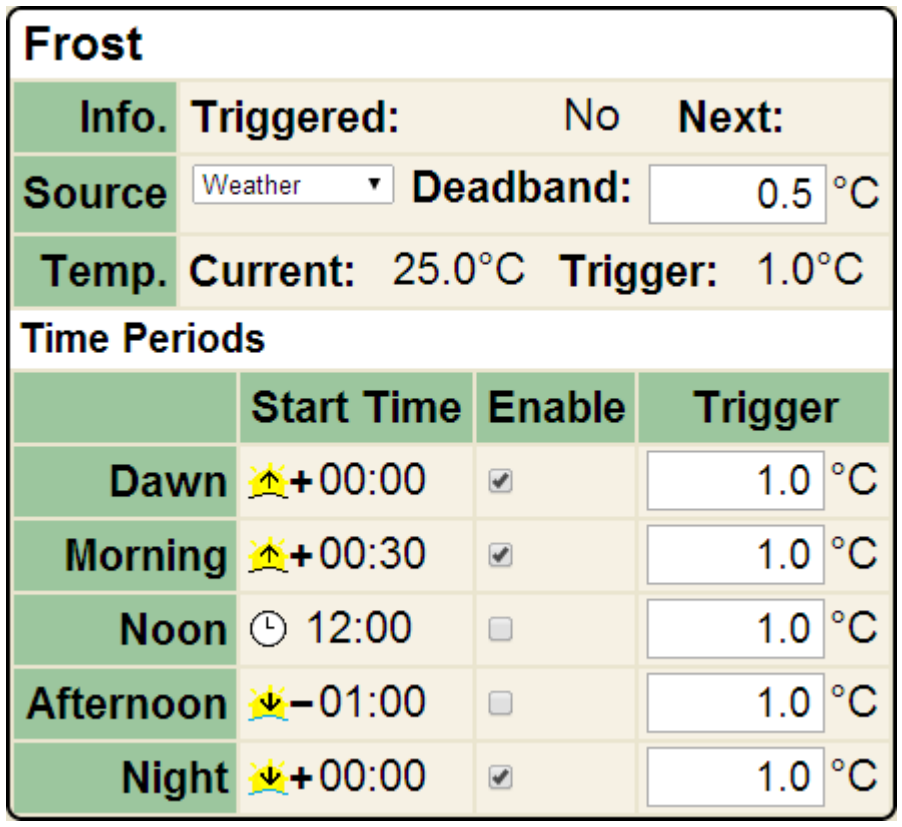
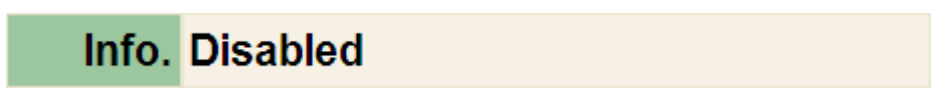
Frost



During cold times of the year it is possible to configure a group to have a temperature based trigger in order to protect crops from frost. A valid temperature source needs to properly configured for this trigger to operate correctly. It is important to note that while the temperature is below the trigger point an irrigation will be constantly request for this group and will not clear until the temperature rises above the trigger level plus the deadband offset. Because of this it is recommended to use the Min. Interval timer in conjunction with the frost triggers, to insure an appropriate time between irrigation occurs.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.



Source: The temperature source this trigger uses as well as the deadband level for the clearing of the trigger.

- ***Weather:*** The frost trigger uses the temperature provided by the weather station.
- ***Independent:*** The frost trigger will use an independent temperature sensor as its source.

Note: If a independent sensor is being used when this option is selected and saved an address box will become visible. The address of the sensor must be entered here. The first box is used to specify the rotary switch address of the device and the second is used to specify whether to use Temperature Probe 1 or 2 (T0 or T1) connected to the device.

Temp.: Current temperature of the specified source. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Enable: Enable a periodic frost trigger for this time period.

Trigger: Desired trigger level for the time period. This is the minimum temperature before a trigger occurs, the temperature source must drop below this for a trigger to occur. Note this value is not visible until the enable is saved.

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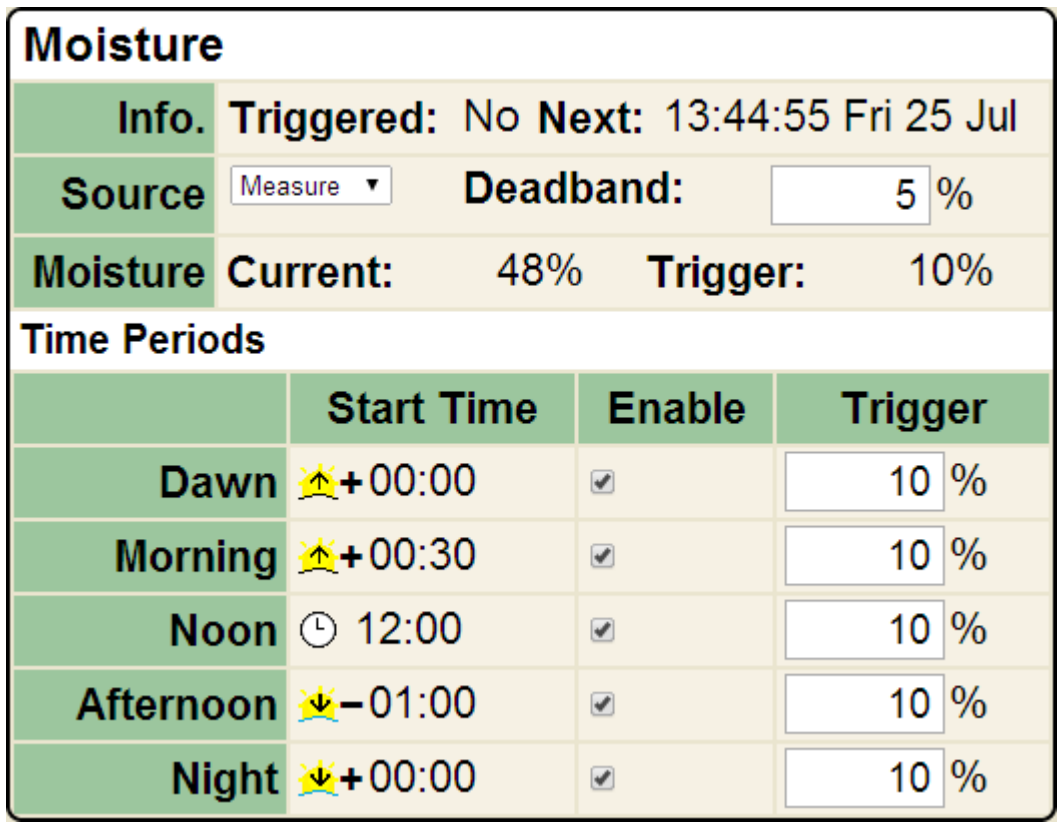
Moisture



It is possible to configure a group to trigger based on a moisture level reading from a specific device. A valid moisture source needs to properly configured for this trigger to operate correctly. It is important to note that while the moisture is below the trigger point an irrigation will be constantly request for this group and will not clear until the moisture level rises above the trigger level plus the deadband offset. Because of this it is recommended to use the Min. Interval timer in conjunction with the frost triggers, to insure an appropriate time between irrigation occurs.

Info.: List information about the trigger, whether is has occurred or when it is predicted next. If the trigger is not enabled during the time period a disabled label will be displayed in the box.

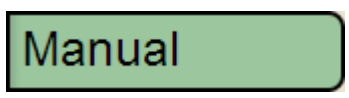
Source: Defines exactly where the moisture input is coming from, this trigger can be activated from any of the three local system sensors. The deadband level for the clearing of the trigger is also set here.

Moisture: Current moisture level of the specified source. The current trigger level for the time period is also displayed here. Not if this is not enabled the trigger value will be empty.

Enable: Enable a periodic moisture trigger for this time period.

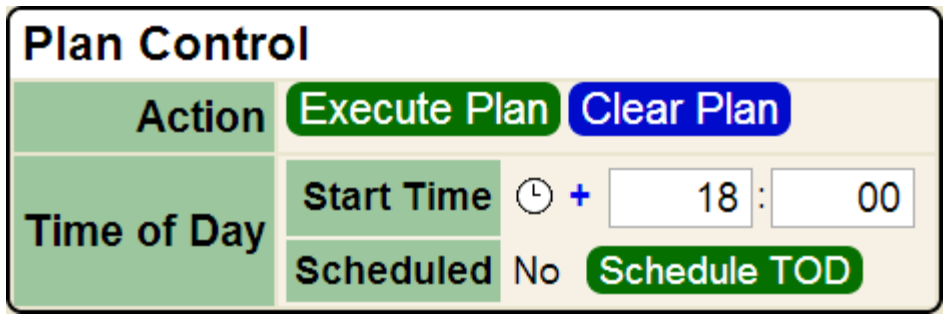
Trigger: Desired trigger level for the time period. This is the minimum temperature before a trigger occurs, the temperature source must drop below this for a trigger to occur. Note this value is not visible until the enable is saved.

Manual



It is possible to configure a group to have a manual watering plan. Enabled this option under the settings tab will reveal the manual tab. Here the members of a group can be reorder, missed or individually water. This is useful when dealing with crops with irregular watering cycle, or greater control over individual stations within the system.

Plan Control



A watering sequence that is manually created is called a Plan, in this box a created plan can be Executed, Cancelled or Cleared. A plan can also be scheduled to run at a certain time of day. This time of day trigger works the same as the manual time of day triggers under the Automatic tab. It will queue a single time of day trigger once this is processed it will then need to be re-scheduled to trigger again (it will not happen automatically). Note

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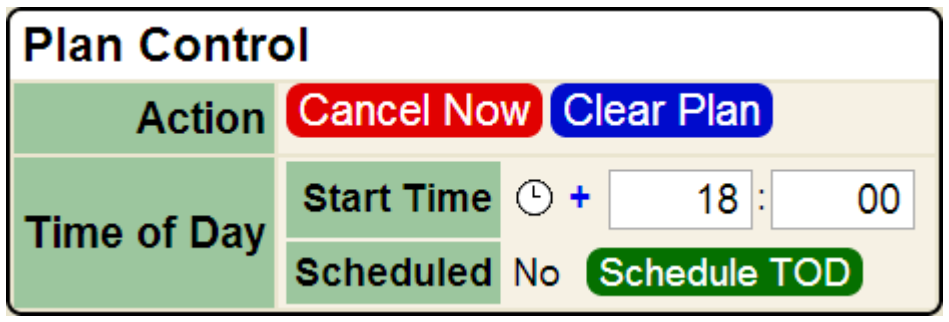
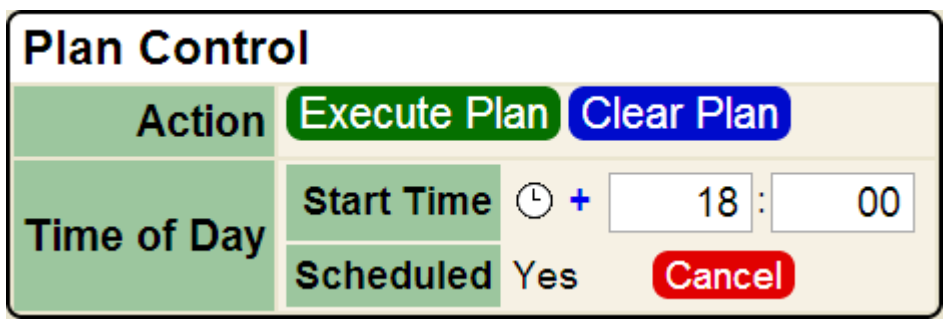
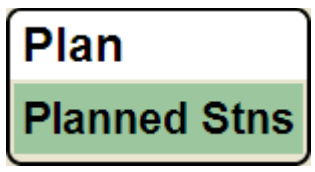
that this manually schedule time of day will ignore any days of the week setting than might be configured on the group.

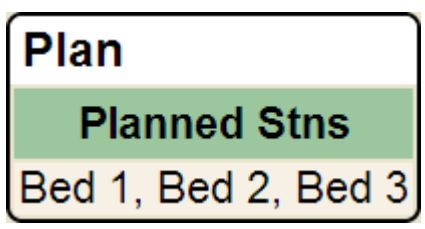




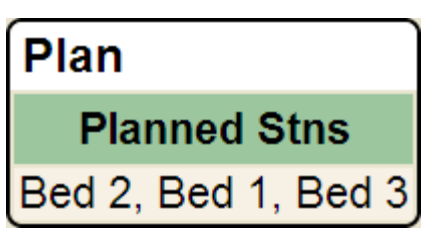
Plan



This holds the current watering plan for the members of the group, once the plan has been watered it will not reset it will stay how is was last configured. The use of the Clear Plan button in the Plan Control settings box must be used to clear the currently configure plan. The name of the stations will be displayed in this list and the order of how they will be watered members can be added out of order from the normal watering plan. If a station does not have a name the station number will be displayed instead.

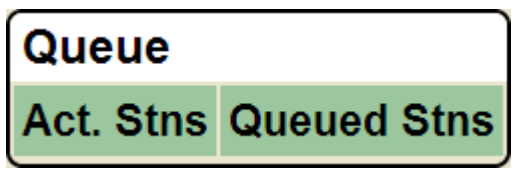


This plan will water Bed 1, Bed 2 then Bed 3.



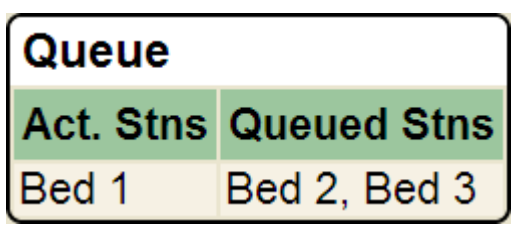
This plan will water Bed 2 first; then Bed 1, then 3.

Queue



A queue is the current state of the plan being executed. Stations that are active will be shown under the Act. Stns box and stations waiting to be executed under the Queued Stns box. If a stations is manually executed while a plan is running it will be added to the end of the Queue.

For example if we are executing the first Plan above.



Bed 1 is currently active with Beds 2 & 3 waiting, after Beds 1 & 2 have run we decide to run Bed 4 manually this will add the stations to the end of the Queue

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Queue

Act. Stns	Queued Stns
Bed 3	Bed 4

Members

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Add	Now	Waiting
2	Bed 2	01 m 00 s	Add	Now	Waiting
3	Bed 3	01 m 00 s	Add	Now	Waiting
4	Bed 4				Disabled

Members operate similarly to the stations page, however members cannot be added or removed here. A manual plan can only exist of members already assigned to the group. Here stations can be added/removed from a plan or triggered manual. The state of the station is also shown here. If a station is disabled under the configuration page it will also be **Disabled** here unable actioned.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Now	Planned
3	Bed 3	01 m 00 s	Remove	Now	Planned
4	Bed 4				Disabled

When a member is added to the plan the field will be updated here you can see the plan button has changed from Plan to Remove pressing this button now will take the member out of the current plan. The State has also changed from **Waiting** to **Planned** indicating this member is in the plan.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Cancel	Running
2	Bed 2	01 m 00 s	Remove	Cancel	Queued
3	Bed 3	01 m 00 s	Remove	Cancel	Queued
4	Bed 4				Disabled

When a manual plan is executed the field are updated again. Since the member is already planned for watering it is unable to be individually triggered anymore. However pressing the Cancel button will remove the stations from the queue or stop it from running if it is currently active. Pressing the Cancel button will not remove it from the plan, similarly pressing the remove button will only take it the member out of the Plan it will not remove it from the Queue. The state here has changed from **Planned** to **Queued** or to **Running** if the station is active.

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Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Cancel	Running
3	Bed 3	01 m 00 s	Remove	Cancel	Queued
4	Bed 4	01 m 00 s	Add	Now	Waiting

After a stations in the plan has completed it will return back to it's **Planned** state if in the plan or **Waiting** if it was manually triggered.

Members

	Name	Manual Run Time	Plan	Trigger	State
1	Bed 1	01 m 00 s	Remove	Now	Planned
2	Bed 2	01 m 00 s	Remove	Now	Planned
3	Bed 3	01 m 00 s	Remove	Cancel	Running
4	Bed 4	01 m 00 s	Add	Cancel	Queued

If a station is not in the plan but manually trigger it will be added to the queue.

pETo Volume

pETo Vol.

pETo Vol. is reading derived from four major environmental readings in order to estimate an approximate Evapotranspiration volume (ETo) for a crop. The Evapotranspiration is a combination of both the evaporation and transpiration of the area it can be useful in determine exactly how much water the plant has lost. The pETo Volume uses accumulated solar, wind speed and vapor pressure deficit (VPD) to estimate the positive volume of the ETo and rainfall to negatively offset it. The option for using pETo Volume is found under the settings tab for a group and must be ticked and applied before this tab is visible.

General

General

Total pETo Volume	0.17mm
Effects	Solar: + 0.14mm Wind: + 0.03mm VPD: + 0.00mm Rain: - 0.00mm
Last Irrigation	11:23:08 Fri 25 Jul
Reset	Reset Now

Total pETo Volume: Total volume measured since the last irrigation. This is the volume that is used to drive pETo triggers under the periodic trigger section of the group.

Effects: A quick overview of the effects each individual reading is currently having on the total volume.

Last Irrigation: Time of the last irrigation for the group.

Reset: Pressing the Reset Now button will clear the pETo volume to 0.00mm

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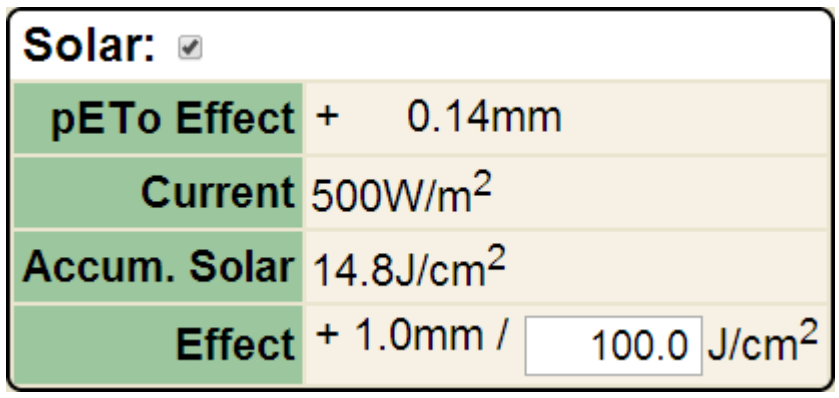
Solar



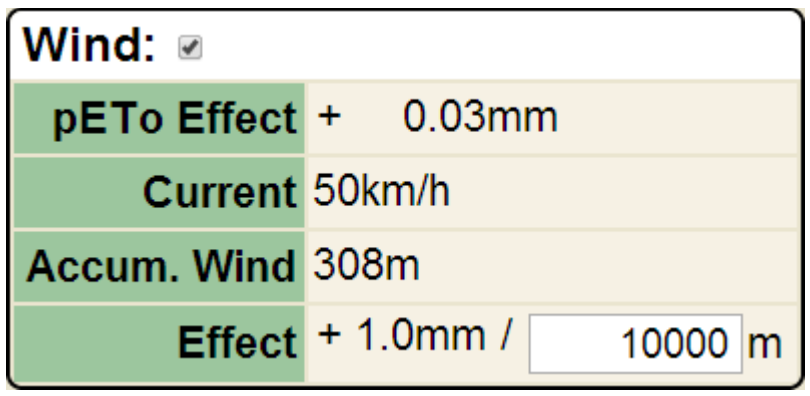
pETo Effect: In order for the solar to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated solar will have.

Current: The current solar being measured. This value is feed from the group solar configured on the settings page.

Accum. Solar: The current accumulated solar radiation since the last irrigation.

Effect: How the accumulated solar will affect the pETo volume. This value is proportional so will be calculated even if the current accumulated volume has not been reached. As you can see above the accumulated radiation is 14.8J/cm^2 with the current setting of 1.00mm / 100.0J/cm^2 this equates to 0.14mm.

Wind



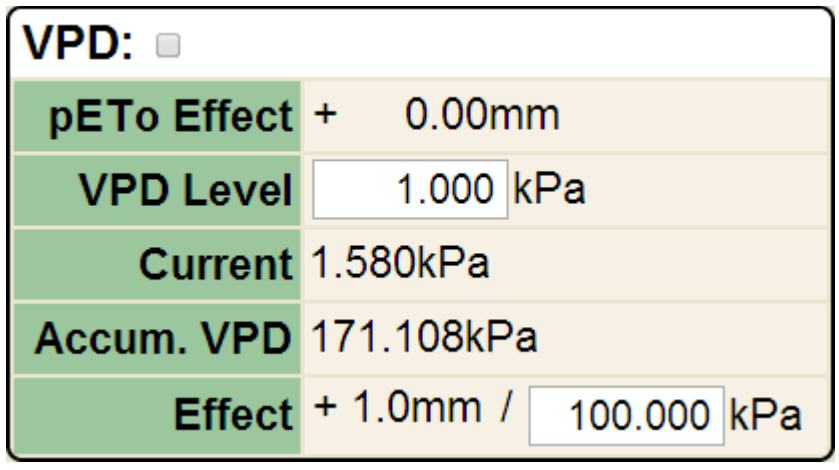
pETo Effect: In order for the wind to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated wind will have.

Current: The current wind being measured. This value is feed from the weather stations and this must be properly configured in order for this to work.

Accum. Wind: The current accumulated wind since the last irrigation.

Effect: How the accumulated wind will affect the pETo volume. This value is proportional so will be calculated even if the current accumulated volume has not been reached. As you can see above the accumulated wind is 308m with the current setting of 1.00mm / 100000m this equates to 0.03mm.

Vapor Pressure Deficit (VPD)



pETo Effect: In order for the VPD to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated VPD will have.

VPD Level: Since the VPD is a constant reading it is only necessary to accumulate it once it has reached a significant level. As the it rises the air can carry more vapor which aids evaporation. Once the VPD reaches the level set here it will being to accumulate in order to give a better representation of how

Current: The current VPD being measured. This value is feed from the weather stations and this must be properly configured in order for this to work.

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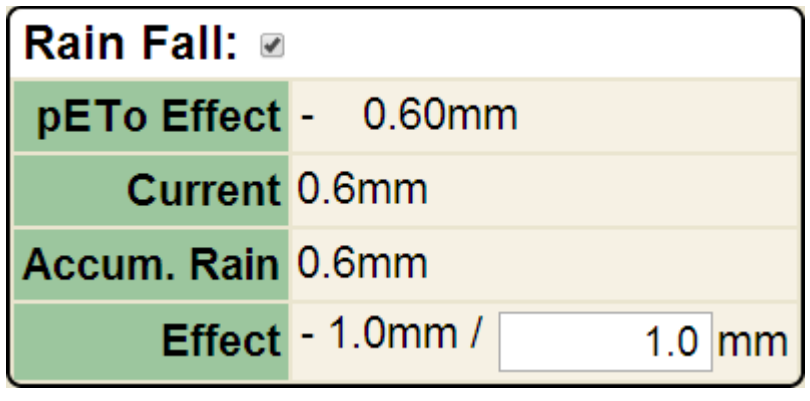
Accum. VPD: The current accumulated VPD since the last irrigation that has been above the set VPD Level.

Effect: How the accumulated VPD will affect the pETo volume.

Rain Fall



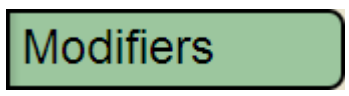
pETo Effect: In order for the rain to effect the pETo volume the tick box at the top must be ticked. If it is not the effect will be zero. The value listed here is the effect the accumulated rain will have.

Current: The current rain fall since midnight. This value is feed from the weather stations and this must be properly configured in order for this to work.

Accum. Rain: The current accumulated rain fall since the last irrigation. Note that the Current is reset at midnight whereas the Accum. Rain is reset on irrigation so it is possible for these values to differ.

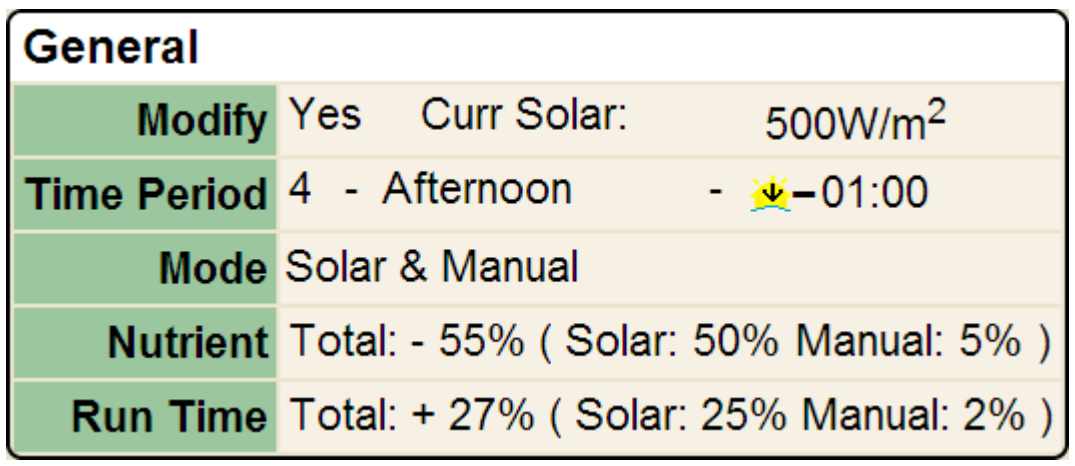
Effect: How the accumulated rain will affect the pETo volume.

Modifiers



Modifiers can be installed in a group to modify the stations run times or nutrient targets if applicable. This option must be enabled on the settings tabs for the group in order to make this tab visible.

General


General
Modify Yes Curr Solar: 500W/m2
Time Period 4 - Afternoon - 01:00
Mode Solar & Manual
Nutrient Total: - 55% (Solar: 50% Manual: 5%)
Run Time Total: + 27% (Solar: 25% Manual: 2%)

Modify: Are modifiers currently needs and the what is the current solar reading this decision is based on.

Time Period: Current active time period, the number, name and start time are listed in this field.

Mode: Current modifier mode configured for this time period.

Nutrient: Total current nutrient modifier and break down of each component. Note if the group is installed on a system with out dosing this modifier will be hidden.

Run Time: Total current stations run time modifier and break down of component.

> Example: If we are trying to irrigate the following group;
> **Group:** Beds 1 & 2
> **Target:** 1.00mS/cm^2
> **Members:**
> * Bed 1 Run Time: 1m00s
> * Bed 2 Run Time: 2m30s
>
> With the current modifiers listed above the resulting settings will be;

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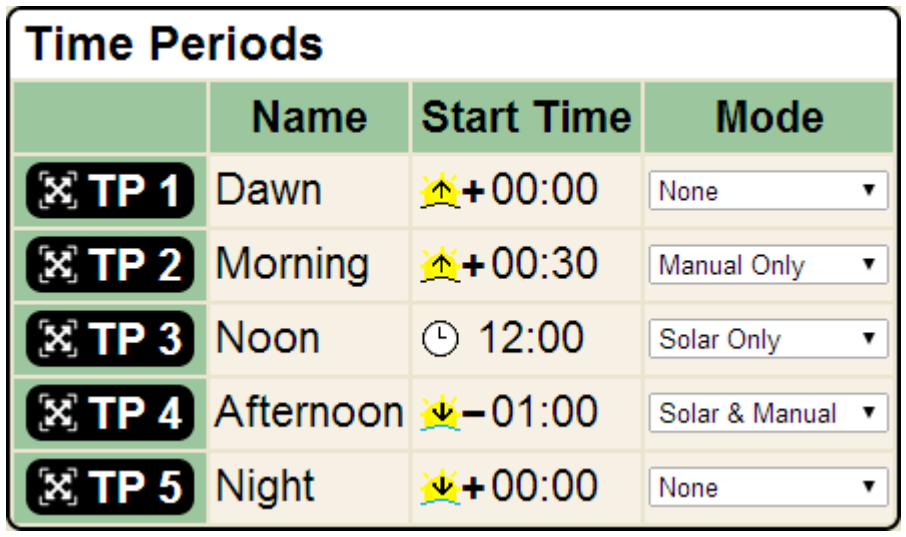
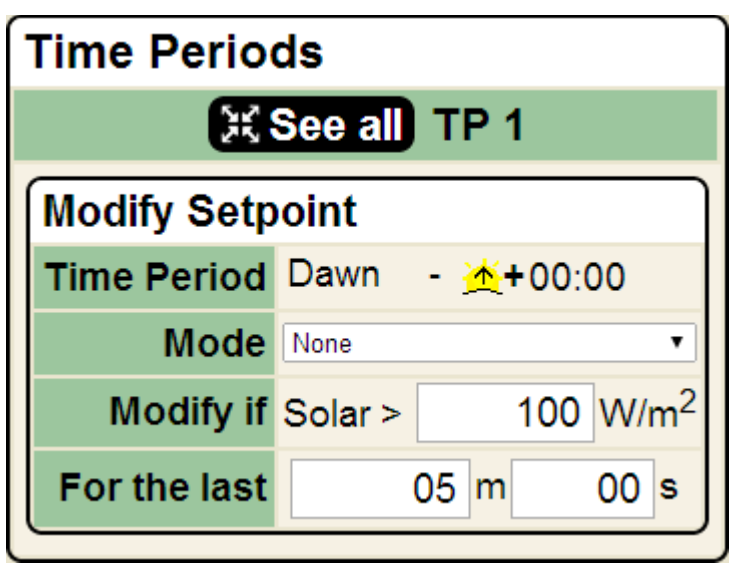
Group: Beds 1 & 2
Target: 0.45mS/cm^2
Members:
* Bed 1 Run Time: 1m16s
* Bed 2 Run Time: 3m10s

Time Periods



Modifiers are time period based settings this is a brief overview of what mode the modifiers are configured for in each one, as well as the name and start time of the particular time period. Pressing the expansion icon on each period will bring up additional modifier settings.

Time Period - Modify Setpoint



On expansion of each time period modifer settings will be displayed. Note that depending on the mode of the time period the information displayed might vary.

Time Period: Current time period name and start time.

Mode: The mode of the modifiers within this time period.

- ***None:*** No modifiers are allowed during this time period.
- ***Manual Only:*** Only manual modifiers are allowed.
- ***Solar Only:*** Only solar modifiers are allowed.
- ***Solar & Manual:*** Both solar and manual modifiers are allowed.

Modify if: This box set the level the solar intensity must reach in order for solar modifiers to be applied. The solar group solar reading is the source this is checked against. This must be properly configured under the group settings tab.

For the last: The solar level must be at this intensity (consistently) for at least this length of time before solar modifiers can be applied.

Modify

The modify box holds the actual modifier settings for the run time and nutrient target of the group. Depending on how the system and time period modify is configure this box may vary in appearance. If the mode has been set to none, this box will not be visible.

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Modify

Modify	Solar					Manual	
Nutrient Target	-	10	% /	100	W/m^2	-	5 %
Station Run Time	+	5	% /	100	W/m^2	+	2 %

The above box contains both nutrient target and run time modifiers as well as both solar and manual modifiers.

Modify: States what variable the modifier will be applied to.

Solar: Current solar modifier, note that in the example a solar intensity of at least 500W/m^2 is needed in order to allow modifiers. Here the Nutrient modifier is set to 10% / 100W/m^2 this mean when the intensity is reached for the desired amount of time, a 50% modifier will be applied. The modifiers are not proportional it will required a further 100W/^{2} before another 10% is added.

Manual: Manual modifiers are always added to the variable regardless of solar level so for the example above the nutrient target will modified by -5% and each stations run time by +2% while the system is in this time period.

Additional Modify layouts

Modify

Modify	Manual	
Nutrient Target	-	0 %
Station Run Time	+	0 %

Manual modifiers only.

Modify

Modify	Solar				
Nutrient Target	-	5	% /	100	W/m^2
Station Run Time	+	2	% /	100	W/m^2

Solar modifiers only.

Modify

Modify	Solar					Manual	
Station Run Time	+	0	% /	100	W/m^2	+	0 %

Solar & Manual modifiers on a none dosing system.

Settings

Settings

The setting tabs contains all the configuration for each group within the system.

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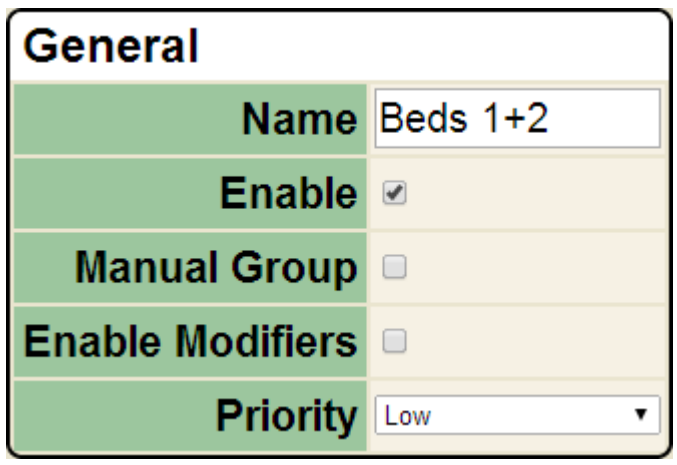
General



Name: Name of the group, this should be keen unique as it is used for identification purposes elsewhere in the system. If this field is left blank the groups number will be used.

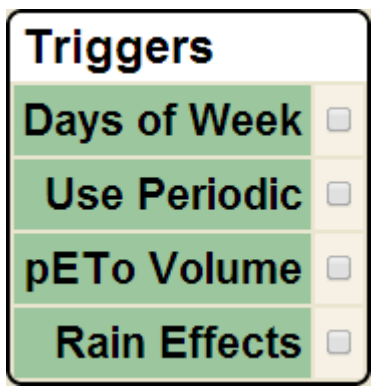
Enable: Where this group is enabled, this is the same setting as the enable on the main group tab. If not ticked this group cannot be triggered.

Manual Group: This will set the group to operate as manual group an additional tab will become available on the left hand side group menu. This will also change the Triggers tab label to Automatic to avoid confusing when configuring.

Enable Modifiers: This will enable modifiers to be used on the group. An additional tab will become available where these can be configured.

Priority: The Multigrow system has two levels of group priorities, setting this to high means that if this group is triggered it will interrupt any low priority running groups. Not a low priority group cannot interrupt a high priority group and a high priority group cannot interrupt another high priority group.

Triggers



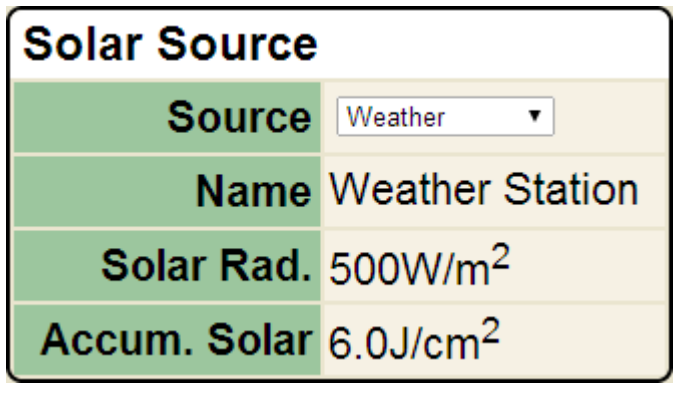
Days of Week: Ticking this box will enable you to select days of the week when this specific group can run. This effect all triggers except for Manual ones.

Use Periodic: If the group is to be triggered from periodic source such as solar, timer, etc. This box must be ticked an additional tab will become available where these triggers can be configured.

pETo Volume: If the group is use pETo triggers, this box must be ticked an additional tab will become available where this can be configured. Also additional options under the periodic triggers to use the pETo volume will become available.

Rain Effects: Does rain effect how this group irrigates.

Solar Source



Each group can have it's own solar source configured, this is to be used in conjunction with the periodic solar trigger as well as solar modifiers.

Source: Source of the solar reading for the group.

- ***System:*** The solar information configured for the irrigation system is also used as this groups solar source.
- ***Compartment:*** A climate compartment solar reading is to be used as the groups solar source.

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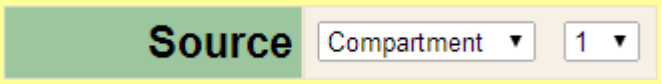
- ***Weather:*** The weather stations is the source of the solar reading this group will use.

If a compartment source is being used an additional setting box will be displayed this must be set to the number of the compartment the desired solar reading is coming from.

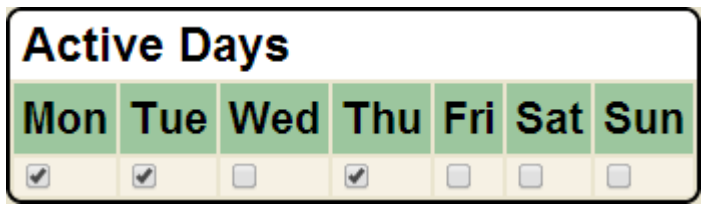


Name: Current name of the solar source, this will either be the name or number of the compartment, the current name or number assigned to the system or weather station.

Solar Rad.: Current solar radiation being reported from the solar source.

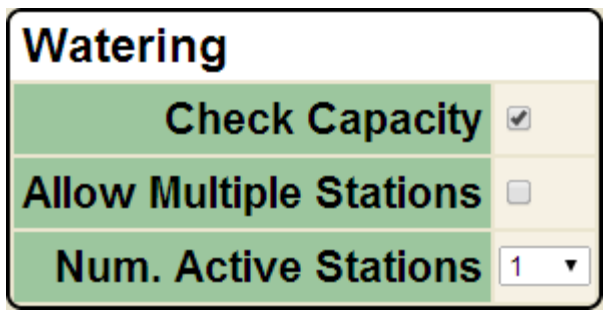
Accum. Solar: Accumulated solar the group has been exposed to since midnight.

Active Days



If the Days of Week tick box is selected under the triggers box this box will be displayed. With in it whatever days of the week the group is allowed to run can be specified. Ticking the box underneath a corresponding day means that the system will be able to run on those days. Note if have selected the Days of Week box but have not specified any days the system will not run. This will effect all automatic and periodic triggers, only manual triggers can be processed on inactive days. In the above example the group can only automatically trigger on Monday, Tuesday and Thursday.

Watering

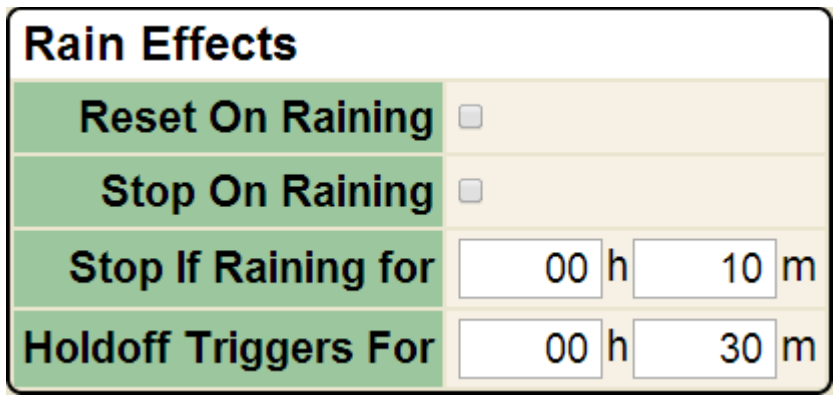


Check Capacity: If a group is set up to ignore capacity a station can run regardless of if there is adequate capacity through the pump. Unticking this box means that careful consideration and manual timing of stations needs to be used when multiple stations and concurrent groups are being used. It is advisable to leave this setting ticked and make sure the system capacity is properly set. If only one group and station is ever going to be run this setting is not really important as the system will always try to run at least one station even if it is over capacity.

Allow Multiple Stations: This will allow the group to run more than one station simultaneously this is useful if the pump capacity can easily provided enough water for multiple stations (zones).

Num. Active Stations: Set the number of stations that can be active at anyone time. The system will try to maintain this as long as the capacity isn't exceeded, unless the check capacity option is disabled.

Rain Effects



Is it possible for some group to contian stations that are directly exposed to rain. If this happens any periodic triggers for the system should reset. Also if the group is currently active and it start to rain the group can be stopped so water is not wasted.

Reset On Raining: Reset any periodic triggers that might be configured on the group.

Stop On Raining: Stop the group if irrigating and rain is detected.

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Stop If Raining for: An irrigation will only be stopped if it has been raining for an X amount time. This setting is only taken into account if the Stop On Raining setting is enabled.

Holdoff Triggers For: If either the Reset on Raining or Stop On Raining settings are enabled and rain is detected, the system will hold of all triggers once it has stop for this time to insure a irrigation is not triggered directly after it has stopped raining.

Info.

The Info. box located on this page is exactly the same as the one on the Stations page for a group, please refer to the Stations section above for more information on this readings box.

Readings

Groups Status

The groups page displays the above information but also changes colours depending on the current groups status the follow states and for are group are described below.

Groups Status

	State	Reason	Act. Count	Info	Last Sum	Rad. Sum	Trigger Level	Total Volume	Station	Action
All Beds	Off	User	1	16:38:35 Tue 19 Aug				55L		Irrigate Now
Grp. 2	Off	User	2	16:33:52 Tue 19 Aug	1.3J/cm^2	7.5J/cm^2	360.0J/cm^2	67L		Irrigate Now

Field	Description
State	Current state of the group
Reason	The last reason an action occurred on a group.
Act. Count	The amount of times the group has been active today.
Info	This will display the time when the group last changed state. If the group is active the Estimated Time remaining for its irrigation will also be displayed in this field.
Last Sum	If a group has solar triggers configured every time the group is triggered the current accumulated solar sum is recorded even if the trigger source was not a solar trigger.
Rad. Sum	The current level of the groups solar accumulator.
Trigger Level	The current trigger level of the group this will be displayed as XXJ/cm^2 if the trigger is displayed for the current time period.
Total Volume	The total volume the group has passed since midnight, this is based on the stations within the groups flow rates.
Station	When a group is active the current stations being irrigated will be displayed here along with their run times and the option to skip. If the group is set up to run multiple stations at once all active station will be displayed here.
Action	This field holds the User Action buttons for a group depending on the current state of the group the buttons displayed here will vary.

If a system is configured as inline an additional field will be present for every group called Correction Factors. Here the current corerection factors for both the nutrinet and pH dosing modules are displayed.

Correction Factors
Nutrient: 100% pH: 100%

Disabled

Disabled	Solar	8	10:42:21 Wed 20 Aug	9.1J/cm^2	0.6J/cm^2	9.0J/cm^2	1890L		

If a group is disabled on the Settings -> Groups main overview the group will become grey, this will also remove any action buttons from the group. A disabled group cannot be trigger by any means even manually it must be enabled first. If the solar trigger was is enabled on a disabled group all the relative solar information will still be displayed and the Rad. Sum will still be accumulated by the group.

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Off

Off	Time Out	5	10:19:31 Wed 20 Aug	3.6J/cm^2	8.3J/cm^2	9.0J/cm^2	1575L		Irrigate Now

When a group is inactive all relative information for the group is displayed, the only valid action from an off group is to manually Irrigate Now. The reason and info listed in an off group are the information from the last irrigation for the group.

Pending

Pending	User	6	10:30:35 Wed 20 Aug	0.7J/cm^2	0.7J/cm^2	9.0J/cm^2	1587L		Clear Pending

If a group is triggered by cannot run yet because maximum number of groups or system capacity has been reached the group will become pending. WHen this occurs the group will turn a light blue to indicate this, when a group is pending it can be manually cleared by pressing the Clear Pending button now visible in the action field.

Pending (Batch System)

Pending Filling	User	0	16:32:10 Tue 19 Aug	16.9J/cm^2	17.0J/cm^2	360.0J/cm^2	0L		Clear Pending

When a group is trigger on a batch system the group must wait for the batch tank to be ready, this makes the group enter the pending state but being held off by the batching module. The group will turn a blueish colour to indicated this, the current state of the batching module will also be displayed in black underneath the Pending state message. Like a normal pending group these groups can also be cleared, note that if this happens the batching system will continue to run until a stable state is achieved. If the group is cleared the batch system will stop dosing but will continue to fill or complete a stir cycle if that was the operation it was doing, the tank will most likely be left in a waiting full state if this sequence occurs.

On

On	User	2	16:33:51 Tue 19 Aug ETR: 0h 0m 47s	1.3J/cm^2	0.1J/cm^2	360.0J/cm^2	35L		Name	Time Remaining	Skip	Pause Now
								Stn 1	Bed 1	0m 56s	Skip Now	Cancel Now

When a group becomes active it will turn green to indicated this, the state will also be updated to On. When a group becomes active the info box will be updated with the time of the trigger plus display the estimated time remaining for the group. Since a group has no knowledge of when it maybe interrupted or held of because of flow the time is only an estimate. The station field will also be populated with the active stations within the group. While a group is active the action button changes to Pause Now and Cancel Now these are the two valid options.

On (Multiple Stations)

On	User	9	10:45:19 Wed 20 Aug ETR: 0h 10m 25s	2.1J/cm^2	0.4J/cm^2	9.0J/cm^2	1913L		Name	Time Remaining	Skip	Pause Now
								Stn 1	Bed 1	9m 35s	Skip Now	Cancel Now
								Stn 2	Bed 2	0m 35s	Skip Now	

If a group has been setup to use multiple stations it will operate exactly the same as a single stations group. The stations field will just contain more enters for the number of stations the group is allowed to run. If the group does not or cannot run the maximum number of stations as allowed field will still be displayed.

	Name	Time Remaining	Skip
Stn 1	Bed 1	8m 41s	Skip Now
Stn 2		0m 0s	Skip Now

On (Pending)

On (Pending)	Time Out (Time of Day (Auto))	4	16:47:49 Tue 19 Aug ETR: 0h 5m 13s	0.8J/cm^2	3.9J/cm^2	9.0J/cm^2	280L		Name	Time Remaining	Skip	Pause Now
								Stn 1	Bed 1	5m 24s	Skip Now	Cancel Now
												Clear Now

A group may take a long time to finish a single irrigation cycle of all the groups configured. It is possible that since the time the group has started a new trigger has been requested for the group even though it is still active. If this happens the new trigger will be queued (Pending) until the group has finished running, once the group has finished irrigating it will then process the pending trigger and the group will start running again. In this state the

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(Pending) will appear under the on label, the reason for the pending trigger will also be displayed under the current active reason. The action field will also contain three buttons; Pause will pause the current active irrigating, Cancel will can the current active group (Note that the pending trigger will be processed once the group is cancelled) and Clear which will clear the pending trigger but not effect the current irrigation (Note a pending trigger cannot be cleared when a group is paused it must be resumed first).

If a second group has been pending before the first group generates a pending trigger the secondary group will become active before the current group is allowed to restart again.

Paused

Group Pause

Paused	User	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	5.8J/cm^2	9.0J/cm^2	312L		Name	Time Remaining	Skip	Resume Now
								Stn 1	Bed 1	4m 13s	Skip Now	Cancel Now

Once a group is running the Pause Now button becomes available pressing this will stop the current irrigation for that group and hold its current progression. This can allow another group to run or to fix a problem within an active group without having to restart the group. In this state the group will turn a light purple colour, the reason will become User and the stations within the group will be appended with (Paused). In this state the group can be resumed or cancelled using the appropriate buttons, Note if other groups are pending they will immediately start running once the active group is paused.

System Pause

Paused	Pump Error	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	7.0J/cm^2	9.0J/cm^2	322L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	8m 57s	Skip Now	

When a system pause occurs on with the irrigation system all active groups on the system will be paused it will also stop any additional groups from being triggered. When a system pause occurs the reason will be overwritten with the pause reason of system and the group will become a light purple colour.

System Pause (User)

Paused	System Pause	12	11:46:25 Wed 20 Aug ETR: 0h 11m 2s	3.3J/cm^2	3.3J/cm^2	9.0J/cm^2	2298L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	8m 34s	Skip Now	

A whole irrigation system can be manually paused on the Readings -> Status page this will cause all active groups to groups on the system to be paused. This will cause the group to change to light purple colour and update the reason of the group to system pause to indicate that this has happened. This differs from a group pause because no other groups on the system can run or be resumed only by resuming the whole system will groups become active again. It is possible however to cancel a paused group in this condition.

Interrupted

Interrupted	User	4	16:47:49 Tue 19 Aug ETR: 0h 10m 0s	0.8J/cm^2	9.7J/cm^2	9.0J/cm^2	345L		Name	Time Remaining	Skip	Cancel Now
								Stn 1	Bed 1 (Paused)	9m 9s	Skip Now	

It is possible for a group to be set up as a high priority group, if a high priority groups becomes active while a low priority group is irrigating the low priority group will be interrupted. When this happens the low priority group is paused until the high priority group has finished running. A group will only be interrupt if either the max number of active groups has been reached or the system capacity will be exceeded otherwise both groups will run concurrently. If a group is interrupt it will turn light purple the reason will also change to User.

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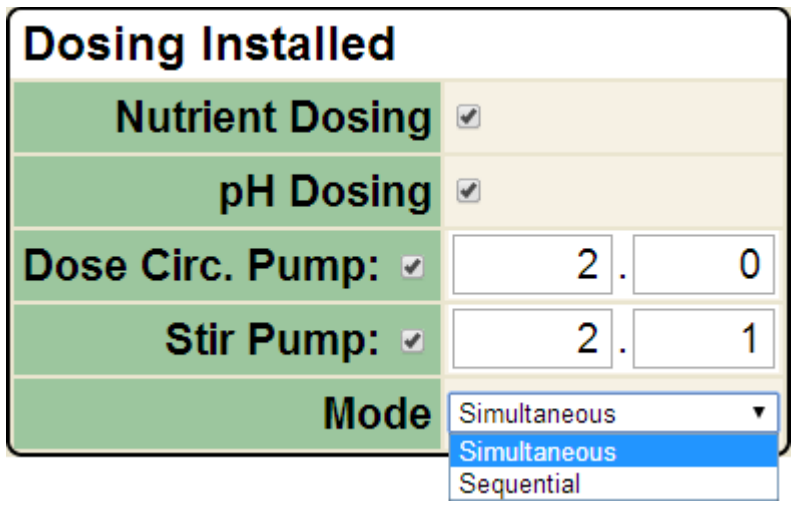
Dosing

Configuration

Install



Nutrient Dosing: This box must be ticked if nutrient dosing is to be used within the batch system.

pH Dosing: This box must be tick if pH correction is to be done on the batch system.

Dose Circ. Pump: Ticking this box will enable the use of a "Circulation Pump" to supply large volumes of nutrient/pH to the dosing valves. This will also enable an output expander address box to be configured.

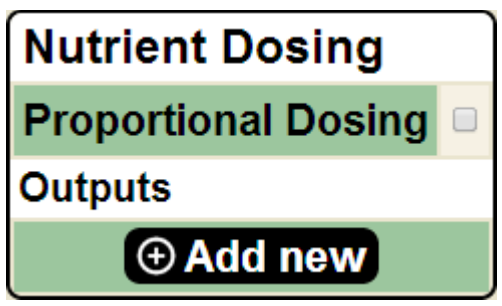
Stir Pump: Ticking this box will enable the use of a Stir Pump within a continuous system. This will also enable an output expander address box to be configured.

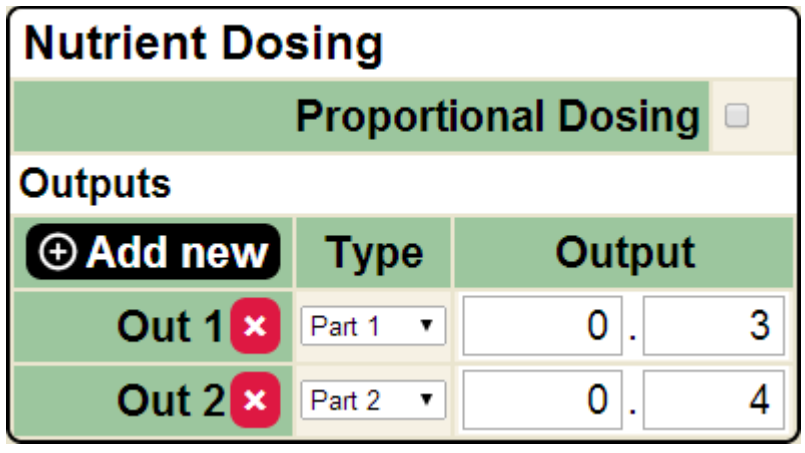
Mode: Controls how the Nutrient and pH dosing valves work together in the system. If all the dosing valves are wired on to the same output expander it is possible for them to all turn on at the same time. This may cause a large inrush of current which the output expander might not be able to handle.

- ***Simultaneous:*** Both the nutrient and pH dosing valves will act independently of each other.
- ***Sequential:*** Nutrient and pH dosing valves cannot operate at the same time.

Nutrient Dosing

If the Nutrient dosing has been installed the option for added nutrient dosing valves will become available. Each irrigation system can support up to 10 different nutrient parts, except for a watering system where no dosing can be installed.





Proportional Dosing: Proportional dosing means that the dose time for nutrient doses will change in relation to how far away from the target the current reading is.

Type: Once a valve is installed the type field can be seen, this is used to specify which Part of the nutrient mix this valve is physically connected to.

Output: Address of the output expander this valve is wired to, see section 3.1 configuring a single output for more information.

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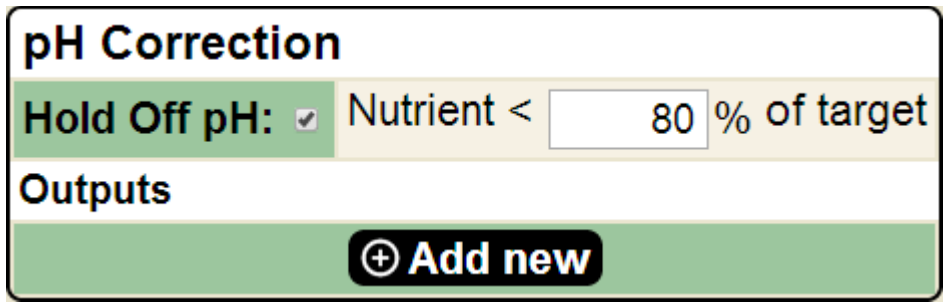
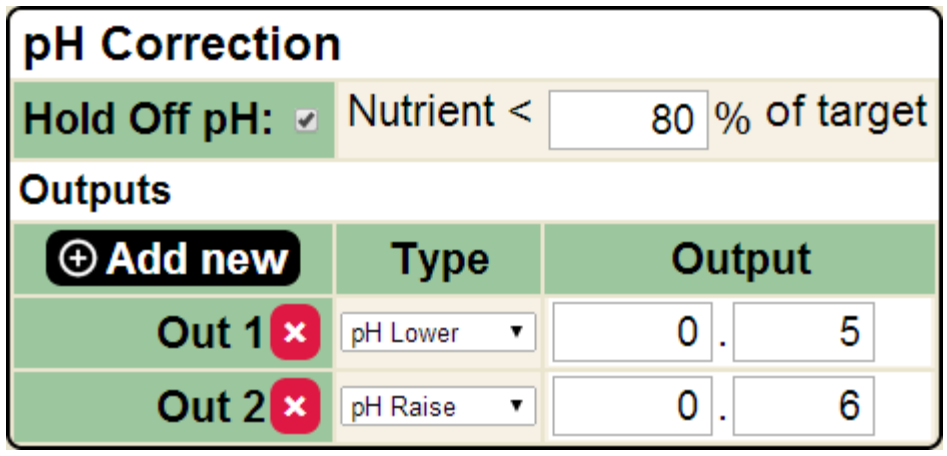
pH Correction

If the pH dosing has been installed the option for added dosing valves will become available. Each irrigation system can supports both raise and lower pH correction, except for a watering system where no dosing can be installed.





Hold Off pH: When nutrients are mixed into a tank they can have an effect of the pH of the water. It is recommended to hold off pH dosing until the nutrient level of the tank gets closer to the target at which point the nutrient dosing will ease off.

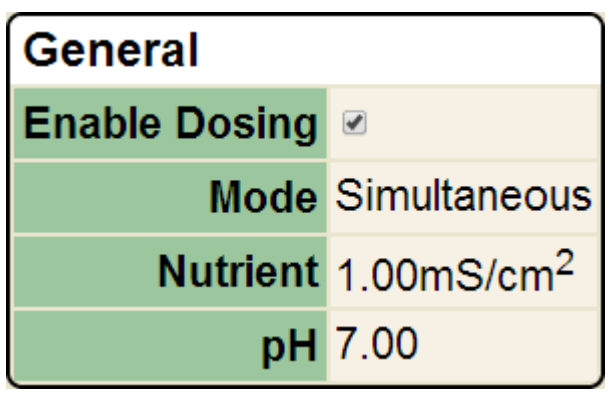
Type: Once a valve is installed the type field can be seen, this is used to specify which type of pH correction raise or lower this valve is physically connected to.

- ***pH Raise:*** When this output is driven Alkali will be dosed into the system raising the pH.
- ***pH Lower:*** When this output is drive Acid will be dosed into the system lower the pH.

Output: Address of the output expander this valve is wired to, see section 3.1 configuring a single output for more information.

Settings

General



Enable Dosing: An overall enable for the dosing system this must be ticked for both pH and Nutrient dosing to occur on the system.

Mode: Current dosing mode of the system.

- *Simultaneous:* Nutrient and pH valves can operate whenever they need to.
- *Sequential:* Nutrient and pH valves can operate at the same time.

Nutrient: Current nutrient reading for the system being provided by the Measure EpM sensor group.

pH: Current pH Reading for the system provided by the Measure EpM sensor group.

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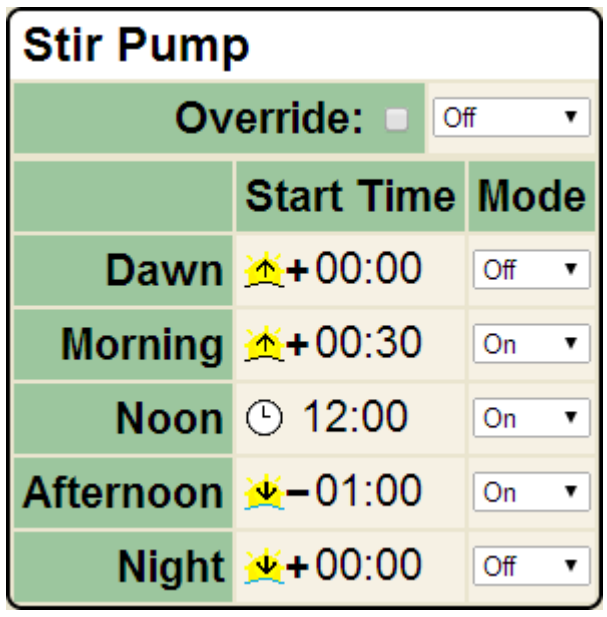
Stir Pump



The still pump has very limited settings the output can either be software overridden and on/off mode specified for each time period. Note that if a stir pump is installed it must be on for dosing to happen within the time period.

Override: Ticking the box will force the output to the state specified in the drop down box.

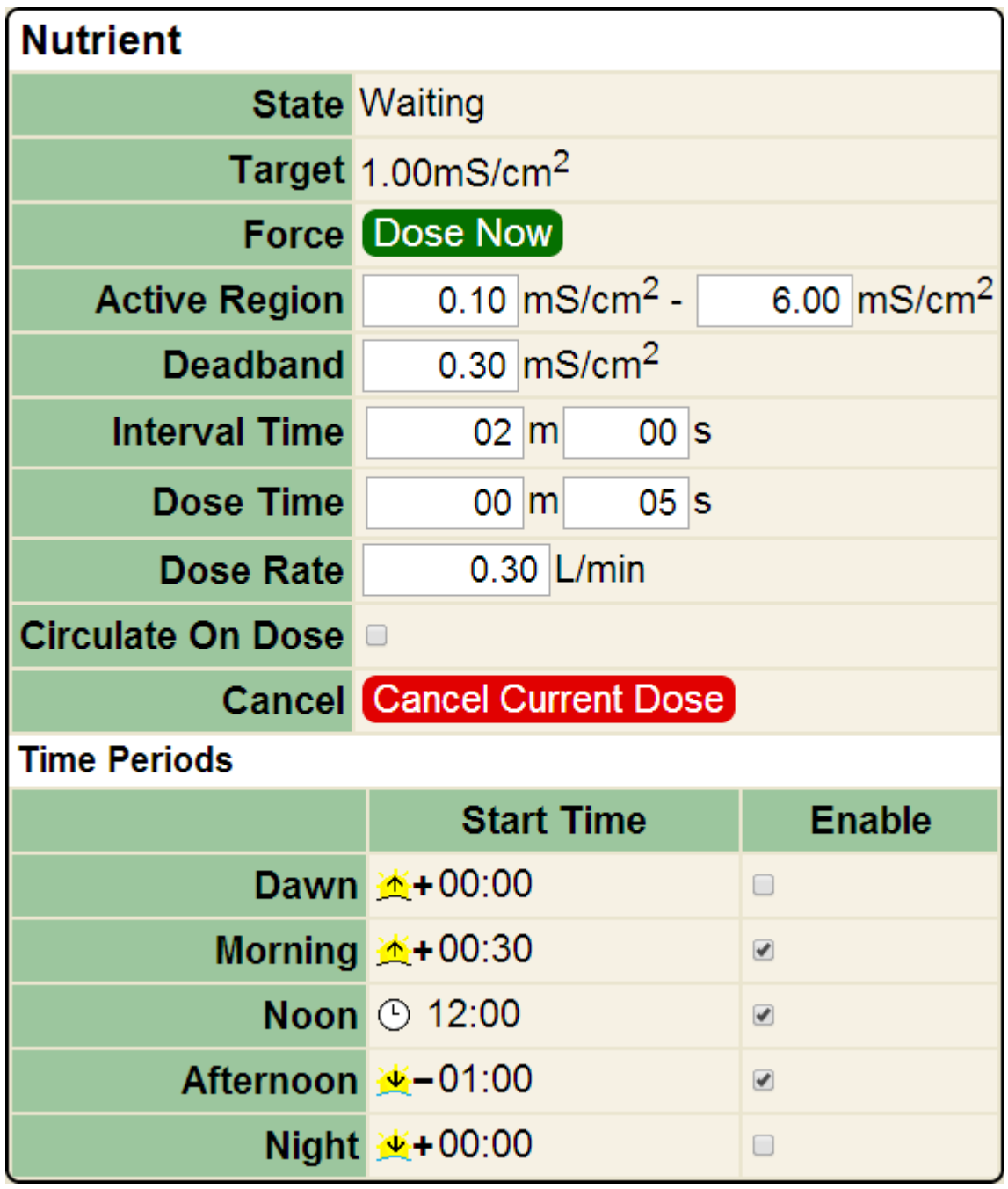
Mode: Whether the stir pump is on or off for a particular time period.

Dose Circulation Pump

A dose circulation pump is controlled by the individual dosing modules within the system and does not have any real setting of its own. The output can only be software overridden.

Override: Ticking the box will force the output to the state specified in the drop down box.

Nutrient



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State: Current state of the nutrient dosing module.

Target: Current target the module is trying to achieve, this is specified in the program and can change per time period.

Force: Pressing the Dose Now button force the nutrient module to turn on the dosing valves for the dose time specified, not that after a forced dose the module will enter the interval state in order to stop a normal dose happening directly after a forced dose.

Active Region: The active region is to try an stop overdosing if an error has occurred. The two settings are the lowest and highest value the nutrient can be and dosing can still happen. If the probe is no longer in water it will return a reading of zero, since the probe is not in the water it will be unable to detect the effects of a dose so it should not be done. A reading on the high should never be possible as the module will stop dosing when the target is reached, however if the probe has become faulty a high reading might occur. It is wise to set the upper region to a value 50% high than the target.

Deadband: Once the target is reached the dosing module will shut off, the level of nutrient must then drop below the target - the dead band in order for dosing to restart.

Interval Time: Once a single dose has occurred the module will enter the interval state. Once here it must wait for the time specified in this field before another dose can occur. The interval time is needed to insure that the the last doses effect has been fully reacted throughout the tank.

Dose Time: The dose time specifies how long the maximum time is a dosing valve will be on for. Using the example above if the current recipe calls for 100% of part A and 50% of part B, Dosing valve A will be on for 5 seconds where as valve B will be on for only 2.5 seconds.

Proportional Dose time

If the nutrient dosing has been configured for proportional dosing additional setting will be available.

Min. Dose Time	00 m 02 s
Max. Dose Time	00 m 10 s
Prop. Band	1.00 mS/cm^2

Min. Dose Time: If a dosing valve is active it must be at least on for 2 seconds if dosing at 100%.

Max. Dose Time: A dosing valve cannot be on for longer the 10 seconds.

Prop. Band: The size of the proportional band the dose time will be scaled across in relation to the target and current reading.

Proportional dosing means the maximum on time for the dosing valves will change proportionally to how close to the target the current nutrient value is. This means that the further away from the target you are the more dosing will happen this allows the module to reach the target a lot faster than set time dosing. The proportional band is set to start from the target - deadband - prop band to the target - deadband.

Proportional Dosing Example:

- **Target:** 1.80mS/cm²
- **Deadband:** 0.30mS/cm²
- **Min. Dose Time:** 0m02s
- **Max. Dose Time:** 0m10s
- **Prop. Band:** 1.00mS/cm²
- *Calculated Proportional Band:* 0.50mS/cm² - 1.50mS/cm²

Current Reading	Calculate Dose Time
0.30mS/cm²	10s
0.50mS/cm²	10s
0.80mS/cm²	8s
1.00mS/cm²	6s
1.20mS/cm²	4s
1.50mS/cm²	2s
1.70mS/cm²	2s

Dose Rate: Volume which is passed through the dosing valves if they are constantly on for a minute. This does not effect any control on the system it is used to calculate the volume of the nutrient the module has used per day.

Circulate On Dose: If this box is tick the circulation dose pump will be driven on when the nutrient dosing module is not in the waiting state. This option is only visible if a circulation pump has been installed on the system.

Cancel: Pressing the Cancel Current Dose will cancel any dose that is currently active on the module. Once cancelled the module will enter the

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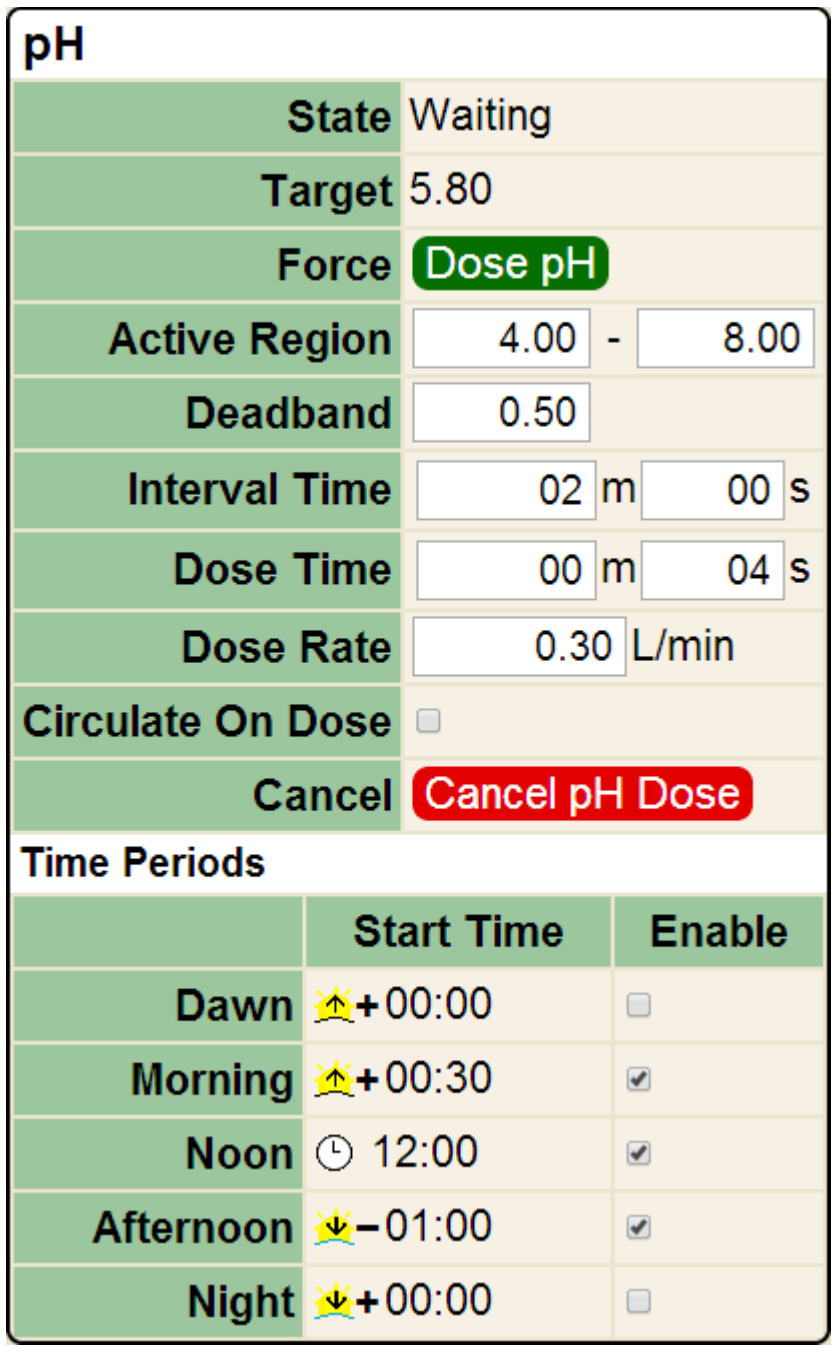
interval state, if the system still required dosing it will start again after the interval state. This button merely cancels the active dose, to stop dosing completely the nutrient settings should be modified to insure dosing is no longer required or enabled.

Enable: Nutrient dosing can be enabled during different time periods to allow greater control of the module.

pH



State: Current state of the pH dosing module.

Target: Current target the module is trying to achieve, this is specified in the program and can change per time period.

Force: Pressing the Dose pH button force the module to turn on the dosing valves for the dose time specified, not that after a forced dose the module will enter the interval state in order to stop a normal dose happening directly after a forced dose.

Active Region: The active region is to try an stop overdosing if an error has occurred. The two settings are the lowest and highest value the pH can be and dosing can still happen. If the probe is no longer in water it will start to drift to either a high or low value this cannot be predicted for a pH probe. Since the probe is not in the water it will be unable to detect the effects of a dose so it should not be done.

Deadband: Once the target is reached the dosing module will shut off, the level of pH must then move outside the target +/- the dead band in order for dosing to restart. The pH deadband having a plus or minus offset is determined by the dosing mode specified in the program.

Interval Time: Once a single dose has occurred the module will enter the interval state. Once here it must wait for the time specified in this field before another dose can occur. The interval time is needed to insure that the the last doses effect has been fully reacted throughout the tank.

Dose Time: The dose time specifies how long the maximum time is a dosing valve will be on for.

Dose Rate: Volume which is passed through the dosing valves if they are constantly on for a minute. This does not effect any control on the system it is used to calculate the volume of the pH module has used per day.

Circulate On Dose: If this box is tick the circulation dose pump will be driven on when the nutrient dosing module is not in the waiting state. This option is only visible if a circulation pump has been installed on the system.

Cancel: Pressing the Cancel Current Dose will cancel any dose that is currently active on the module. Once cancelled the module will enter the interval state, if the system still required dosing it will start again after the interval state. This button merely cancels the active dose, to stop dosing completely the pH settings should be modified to insure dosing is no longer required or enabled.

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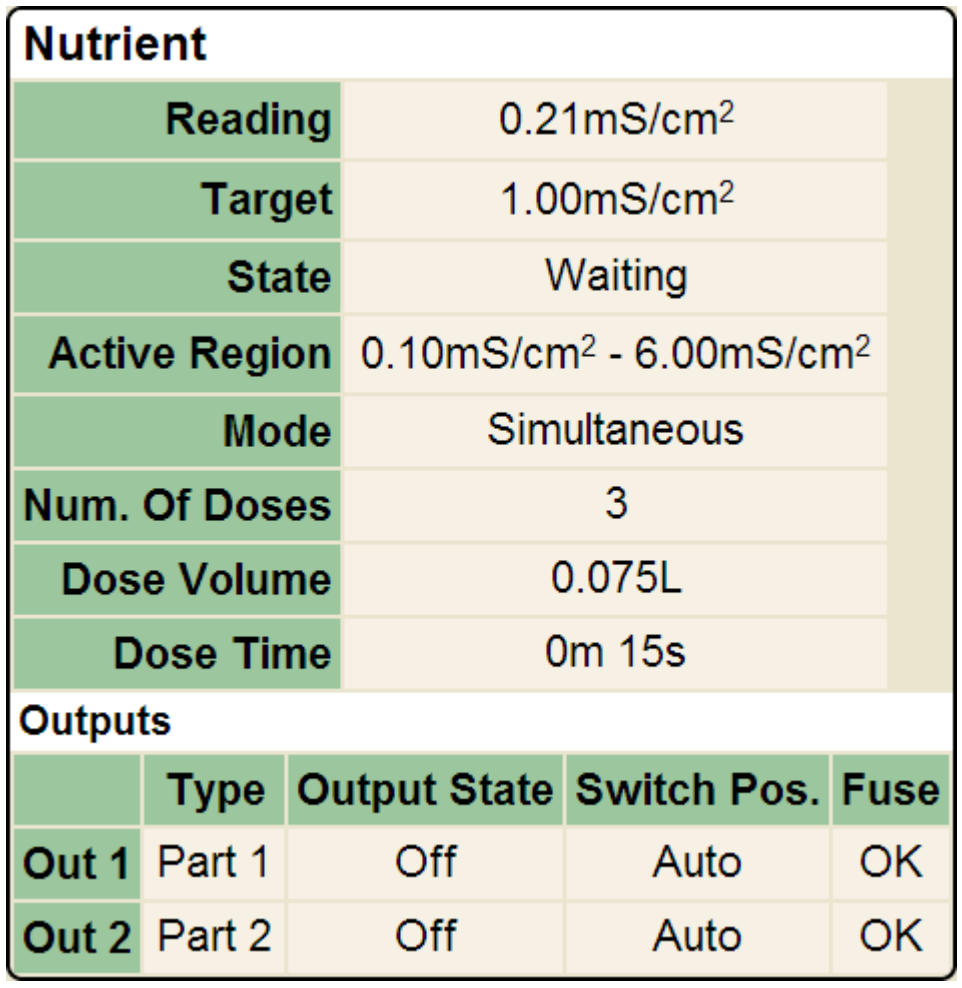
Enable: pH dosing can be enabled during different time periods to allow greater control of the module.

Readings

Nutrient



For this box to be visible nutrient dosing needs to be installed on the current irrigation system.

Field	Description
Reading	Current nutrient reading for the system based on the inputs from the Measure EpM sensor group.
Target	Current nutrient target set by the program, this is what the nutrient dosing module is trying to achieve on the system.
State	Current state of the module.
Active Region	Dosing is only allowed when the nutrient level is within this region this is to stop dosing when the probe is out of water or when the nutrient level is getting too high.
Mode	Current mode of the dosing system as defined on the configuration page, this can be *Simultaneous* or *Sequential*.
Num. Of Doses	Number of doses performed by the module since the last end of day on the system.
Dose Volume	Total volume the doses used today, this is based on the Dose Rate setting for the module.
Dose Time	Total time the pump has been active today, this is based on the Dose Time.
Outputs	
Type	What part this output has been configured to dose.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

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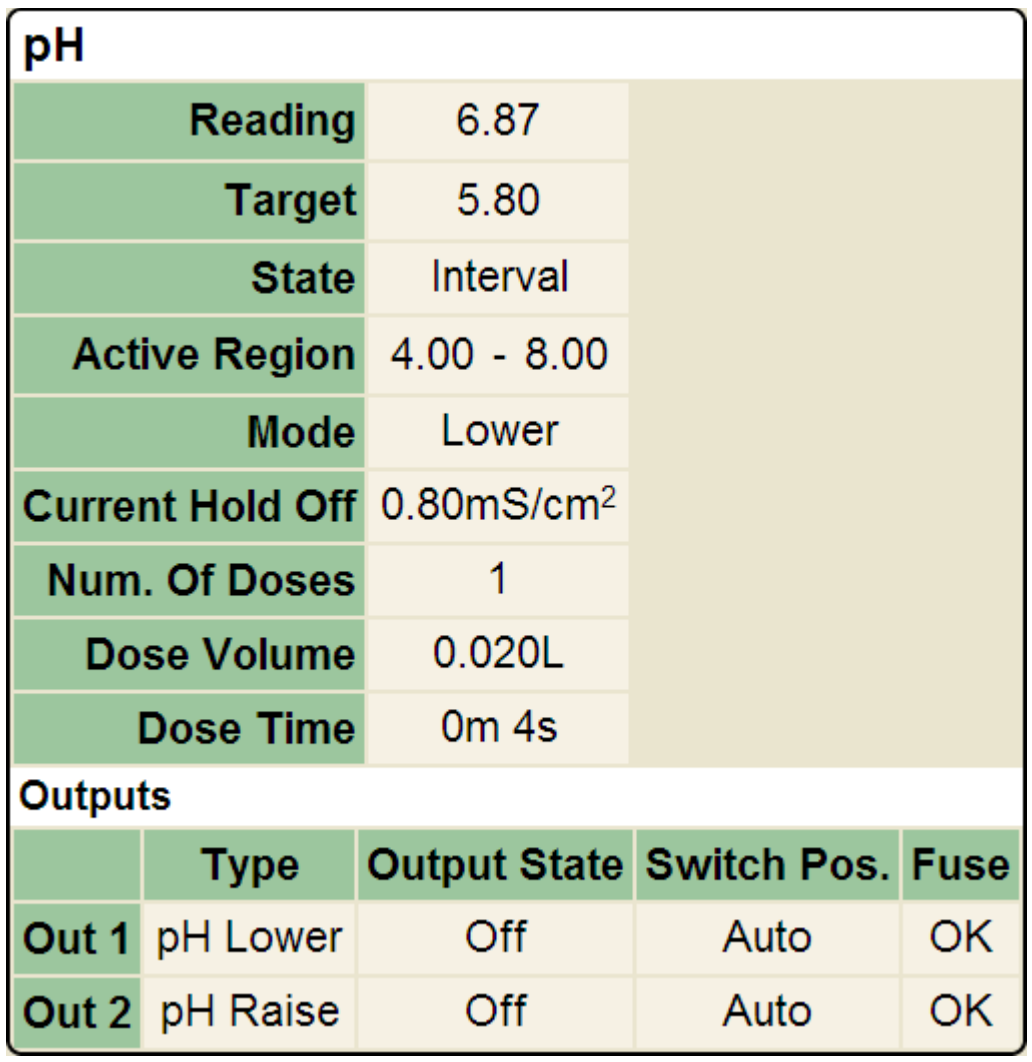
pH

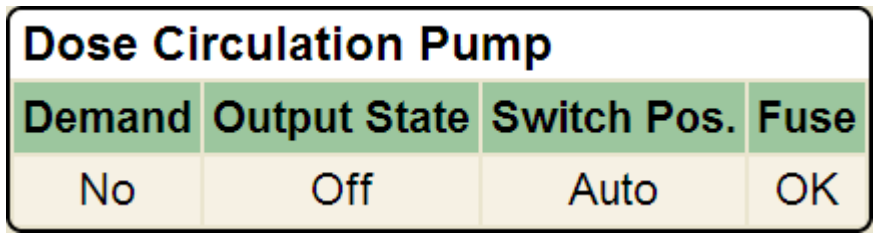


pH				
Reading	6.87			
Target	5.80			
State	Interval			
Active Region	4.00 - 8.00			
Mode	Lower			
Current Hold Off	0.80mS/cm^2			
Num. Of Doses	1			
Dose Volume	0.020L			
Dose Time	0m 4s			
Outputs				
	Type	**Output State**	**Switch Pos.**	**Fuse**
Out 1	pH Lower	Off	Auto	OK
Out 2	pH Raise	Off	Auto	OK

For this box to be visible pH dosing needs to be installed on the current irrigation system.

Field	Description
Reading	Current pH reading for the system based on the inputs from the Measure EpM sensor group.
Target	Current pH target set by the program, this is what the pH dosing module is trying to achieve on the system.
State	Current state of the module.
Active Region	Dosing is only allowed when the pH level is within this region this is to stop dosing when the probe is out of water or when the pH level is getting too high/low.
Mode	Current mode of the pH dosing system as defined by the program, this can be *Lower* or *Raise*.
Current Hold Off	If pH hold off is enabled on the system, the required level the nutrient must be in order for the pH dosing to be allowed.
Num. Of Doses	Number of doses performed by the module since the last end of day on the system.
Dose Volume	Total volume the doses used today, this is based on the Dose Rate setting for the module.
Dose Time	Total time the pump has been active today, this is based on the Dose Time.
Outputs	
Type	What part this output has been configured to dose.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Dose Circulation Pump



Dose Circulation Pump			
Demand	**Output State**	**Switch Pos.**	**Fuse**
No	Off	Auto	OK

If a circulation pump has been installed on the system this box will become visible.

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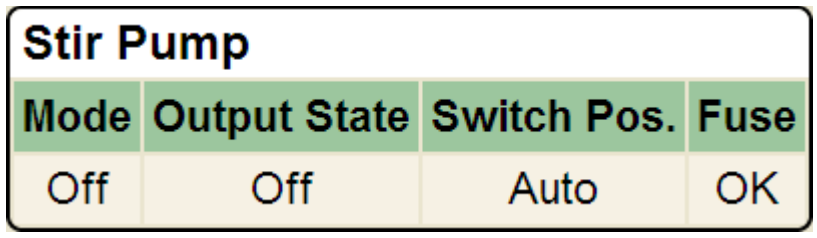
Field	Description
Demand	Is there a current demand from the nutrient of pH dosing modules for the circulation pump to be active.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

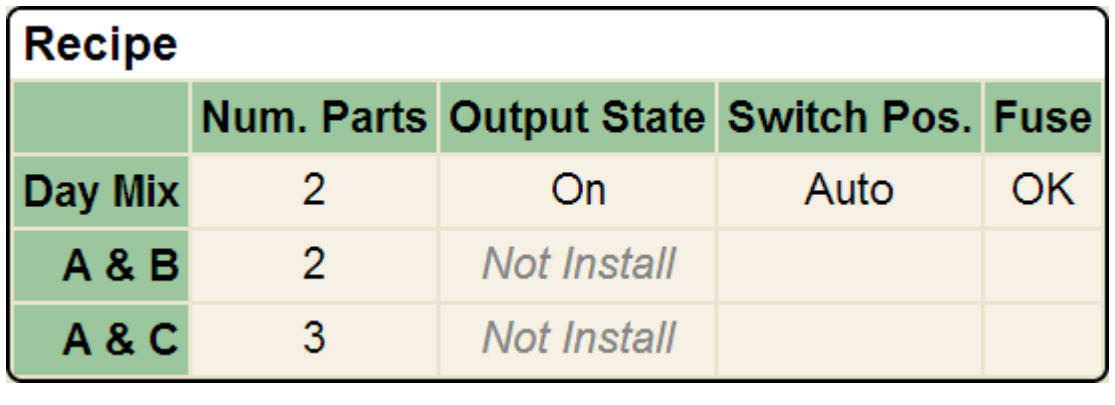
Stir Pump



If a stir pump has been installed on the system this box will become visible.

Field	Description
Mode	This is the current mode set per time period under the dose settings, *On* or *Off*.
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Recipe



This box shows a brief overview of the recipes installed on the system and the number of parts they use, these are configure under the settings section for the system. If a recipe selection output has been configured the state of this output will also be shown here.

Field	Description
Num. Parts	Number of part s configured on the recipe.
Output State	The current state of the output if installed, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Stations

A Station or zone is used to logically separate watering valves within a system. One Multi controller can support up to 300 different Stations or Zones.

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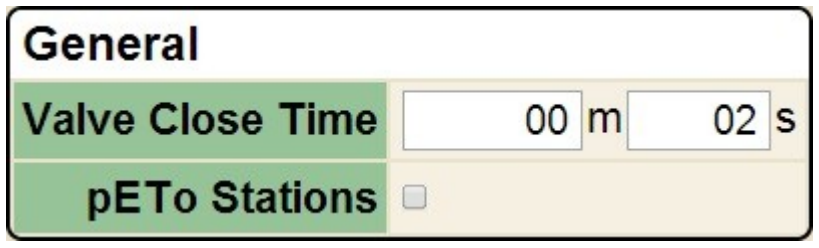
Configuration

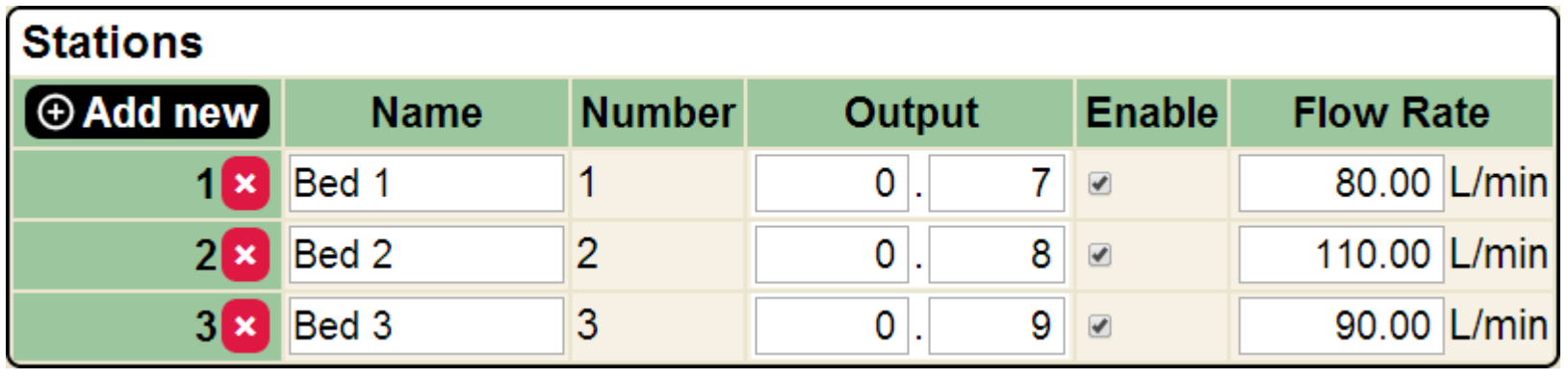
General



Valve Close Time: Most valves require a certain amount of pressure in order to close correctly. This means the pump must be running but the station output itself must be off. This is the time need in order to this to happen.

pETo: pETo is an advanced controlling methodology based around the Evapotranspiration model of plants. This is a very complex control method that should only be used if a full understanding of those this model works. This option is only available on In line and Batched systems.

Stations



Name: This is a unique name given to a specific station within the system. The name itself has no effect on control but is useful for identification elsewhere in the system. It is also used for alerting.

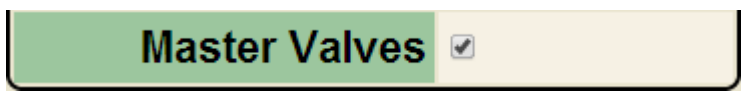
Number: This is an index generated by the system for the corresponding stations it will be used for identification if the name is left blank.

Output: This is the physical output this station is wired. Please refer to section 3.0 Outputs for information about this field.

Enable: A global enable for the station, if a station to be used in watering this must be ticked. Un-ticking it will make this station unable to be watered by the system. This can be useful if this station has becoming faulty it can be disabled globally in one place.

Flow Rate: In order for the system to acknowledge there is a problem with a station, the flow throughput of the station must be known to the system. Once this station becomes active the system will expect the flow rate to be at a certain level based on this setting. Seeing too big of a variation in this reading the system can determine if a problem has occurred.

Master Valve: If master valve are configured on the system, stations can be assigned to use them. Match the number in this drop down box to a Line Number of a particular master valve, in order to turn this valve on when this station becomes active. If this is left blank no master valves will be switched on when this station is running.



pETo Run Rate: If the pETo Stations has been ticked this option will be available. A pETo run rate can be specified for each station the use of this run rate is specified later under the groups setting page.

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pETo Stations	☑

pETo Run Rate				
01	m	00	s	/ 1.0mm
01	m	30	s	/ 1.0mm
00	m	30	s	/ 1.0mm

Readings

Stations

	Enabled	Act. Count	Accum. Vol.	Output State	Switch Pos.	Fuse
Bed 1	Yes	1	32L	Off	Auto	OK
Bed 2	Yes	1	46L	Off	Auto	OK
Bed 3	Yes	1	36L	Off	Auto	OK
Bed 4	Yes	1	28L	On	Auto	OK

Enabled: This reading relates to whether a stations is enabled or not on the system, this is set using the enabled configuration option for the station. If the station is not enabled here it will not be able to be watered by any group.

Act. Count: Current times the stations has been active today, this includes manual operations. Note when counting manual operations the time the satiation is on is not taking into account simply that it has become active. Even if this is only switched on the off for a small interval this count will increase.

Volume: If a flow meter has been installed in the system an this column will visible this holds the current volume for a station. If the station is not active this will be the volume passed through the station during the last irrigation. When a new irrigation starts on this station this value is reset and starts accumulating again.

Accum. Vol.: Current volume the station has passed today, this is reset at the systems end of day.

Outputs State: Current state of the output.

Switch Pos.: Current switch position of the assigned output.

Fuse: Current state of the fuse for the assigned output.

Water System

Configuration

General

General

System Capacity	100.00 L/min
Main Pump: ☑	1 . 1

System Capacity: This setting is important for irrigation systems. It specifies the water throughput capability of the system, this is used to determine if multiple stations or multiple groups can run. It can also be used in certain aspects of dosing.

Main Pump: Ticking the main pump box will display the output assignment box for the pump. A main pump is the pump used for irrigation of the zones, in some cases this can also be used to stir the batch tank.

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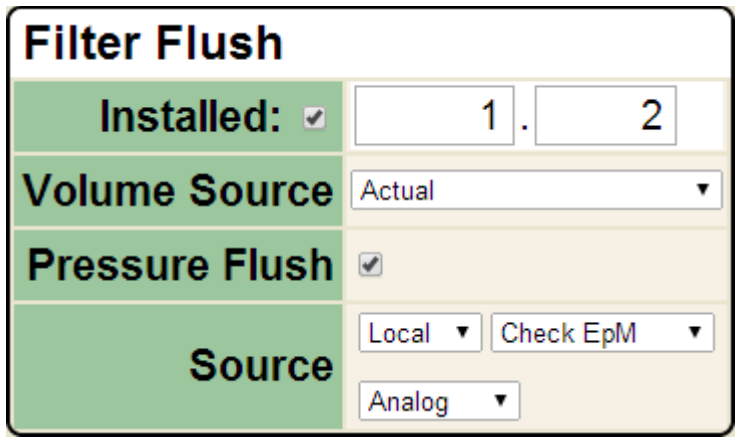
Filter Flush



Installed: If the irrigation system has a filter installed it is usually recommended to flush this periodically. Ticking this box will enable an output to be assigned to the filter flush. When flushing this output will becoming active.

Volume Source: It is possible to select the filter flush on volume to look at either the actual or calculate volumes used on the system.

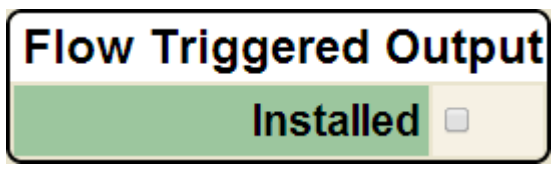
- ***Calculated:*** The filter flush will use the calculated volume reading in order to trigger a filter flush. Note that the calculated volume is derived from the flow rate set under each station with in a system, these values must be correctly enter for accurate results.
- ***Actual:*** The filter flush will use the actual volume reading to trigger. Note that this value is derived using the actual flow supplied by the Measured EpM sensors. A flow meter must be properly configured on the system in order to use this volume correctly.

Pressure Flush: A filter flush can be triggerd from a pressure sensor. A pressure sensor is used to detect when the filter has become to blocked and needs to be flushed.

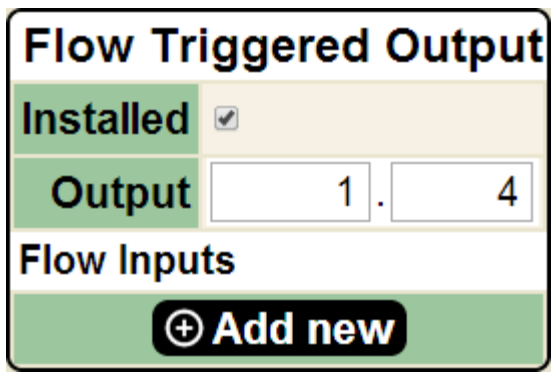
Source: The input where the pressure sensor is physically wired in to. This can be Main or Local EpM sensors CC or Analog (Moist) input.

Flow Triggered Output

A flow triggered output is a general purpose output that can be configured to turn on when flow is detected from any number of sensor sources. Flow levels can be adjusted to make sure the output will only turn on when a certain amount of flow has been detected.



Installed: Ticking this box will install a flow triggered output onto the irrigation system. Once ticked the output configuration options will be displayed.



Output: Address of output that will be driven on when flow is detected.

Flow Inputs

Any number of flow inputs can be added to the system. Once added each one needs to be configured.

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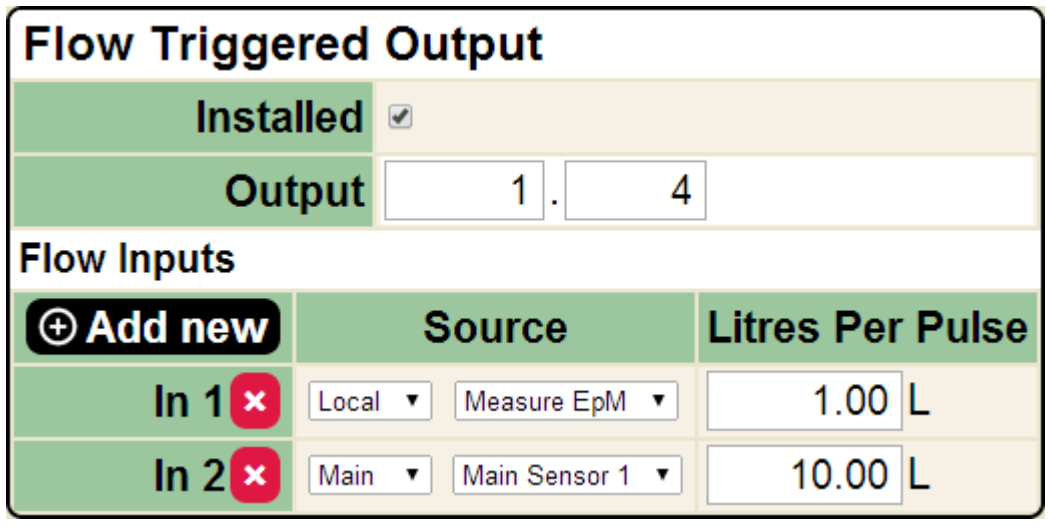
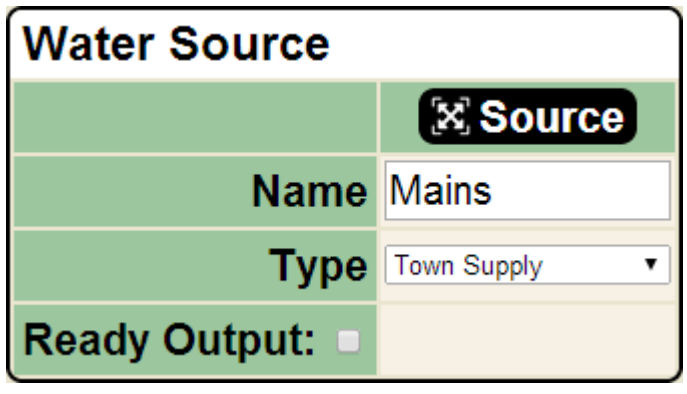


Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
  - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
  - ***Check:*** Flow source is the Check Remote EpM sensor group.
  - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
  - ***Main Sensor 1:*** Flow source is from Main Sensor 1.
  - ***Main Sensor 2:*** Flow source is from Main Sensor 2.
  - ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: Here the flow rate of the desired source is specified, this value should be specified by the manufacturer of the flow meter.

Water Source

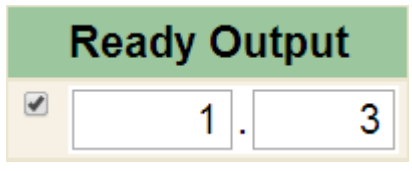


Name: This is a unique name given to the water source useful for identification elsewhere in the system. It is also used for alerting.

Type: Type of water source being used on the system. This can vary depending on individual requirements of the system.

- ***Mains:*** Irrigation system is connected directly to a main water supply.
- ***Tank:*** The irrigation system is feed from a tank. Note this is not the same as a batch tank. If the batch tanks fill input is on the output of another tank then this option should be selected.
- ***Blend Tank:*** This is the same as a normal tank except with the added ability for blending two different fill inputs in order to try and pre-blend the nutrient level of the tank.
- ***Main Tank 1, 2 & 3:*** Main Tanks are identical to normal system tanks but are configured at the site level. This is useful if one tank is to be used across multiple irrigation systems. These are configured outside of an irrigation system, since they are used across multiple systems.

Ready Output: A water source such as a tank may only be ready when it is a certain percentage full, if a ready output is installed this will turn on once the water system has determined it is ready. Note a Town Water source is always ready.



Additional Configuration

Pressing the source button at the top of the box will display additional configuration's for the water source depending on which type of source has been selected.

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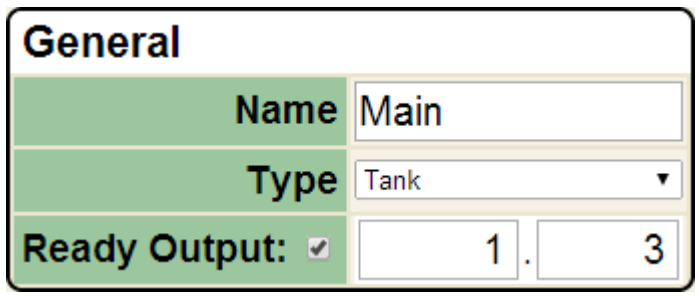
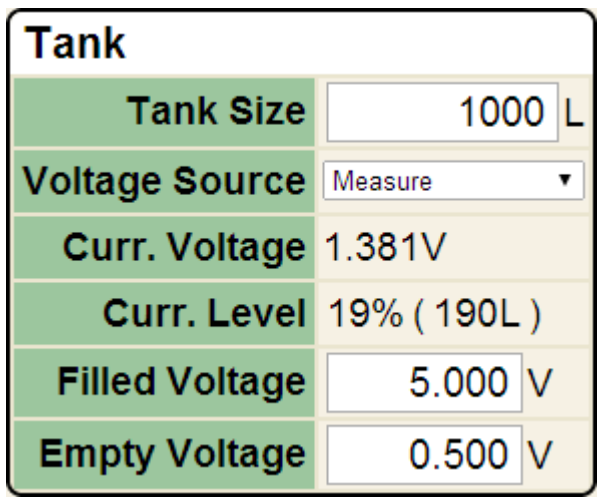
General



The general box displays the same settings as the overview box for the water source. See above for more information of these settings.

Tank



IF the water source is a Tank or a blending tank this box will be displayed here all the information for configuring a tank will be displayed.

Tank Size: Size of the tank being used for batching, this is not crucial to the control of the tank as the voltage readings determine the actual tank level. This is more for user feed back of the tanks exact level.

Voltage Source: The Remote EpM group the tank level sensor is being reported to.

- ***Measure:*** The tank level sensor is connect to a Remote EpM under the Measure Group.
- ***Check:*** The tank level sensor is connect to a Remote EpM under the Check Group.
- ***Source:*** The tank level sensor is connect to a Remote EpM under the Source Group.

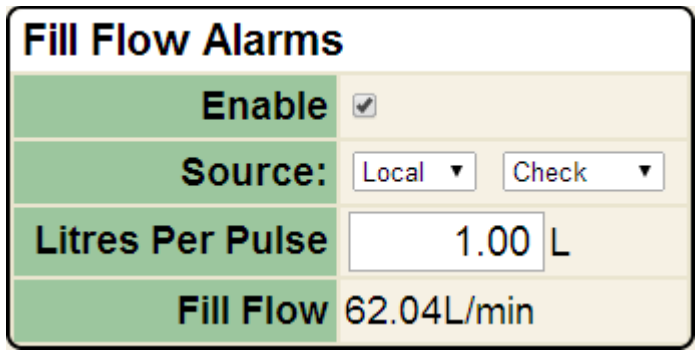
Curr. Voltage: Current voltage on the Moist input of the sensor source selected above.

Curr. Level: Current level calculated from the settings.

Filled Voltage: When the tank is full enter the value being displayed under Curr. Voltage into this field.

Empty Voltage: When the tank is empty enter the value being displayed under Curr. Voltage into this field.

Fill Flow Alarms



IF the water source is a Tank this box will be displayed.

Enable: This box will enable the fill flow alarm on the system. Once ticked and saved additional options will become available.

Source: This is the sensor source this particular input will get its flow readings from. Each Input has up to six different sources it can choose from.

- ***Local:*** Flow source is from a sensor local to this irrigation system.
  - ***Measure:*** Flow source is the Measure Remote EpM sensor group.
  - ***Check:*** Flow source is the Check Remote EpM sensor group.
  - ***Input:*** Flow source is the Input Remote EpM sensor group.
- ***Main:*** Flow source is from a main sensor.
  - ***Main Sensor 1:*** Flow source is from Main Sensor 1.

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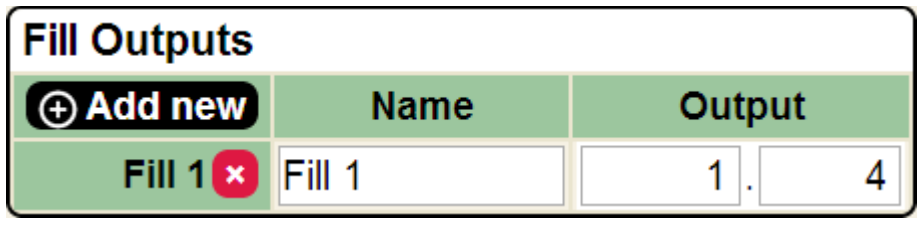
- ***Main Sensor 2:*** Flow source is from Main Sensor 2.
- ***Main Sensor 2:*** Flow source is from Main Sensor 2.

Litres Per Pulse: How many litres is passed through the flow meter before a single pulse is generated, this is specified by the manufacture of the meter.

Fill Flow: Current flow being measured by the configured sensor source.

Fill Outputs

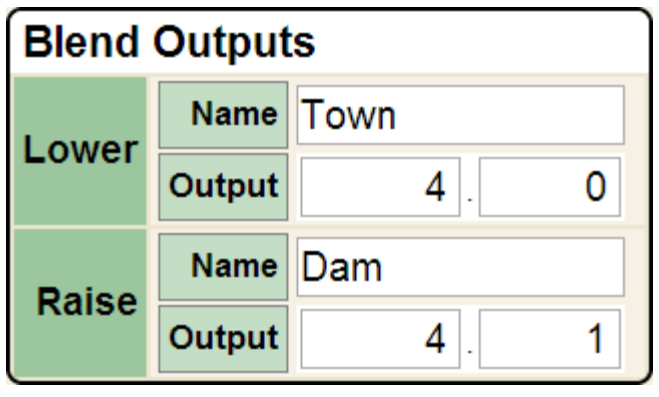


IF the water source is a Tank this box will be displayed. Fill outputs can be added for removed from the tank, a tank can support up to 4 fill outputs.

Name: Name given to the output for identification purposes.

Output: Address of the output the fill valve is physically wired to.

Blend Outputs



IF the water source is configured as a blending tank this box will be displayed.

Lower

The lower output is used to supply water that will effectively lower the nutrient level of the tank, this is usually connected to town water.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

Raise

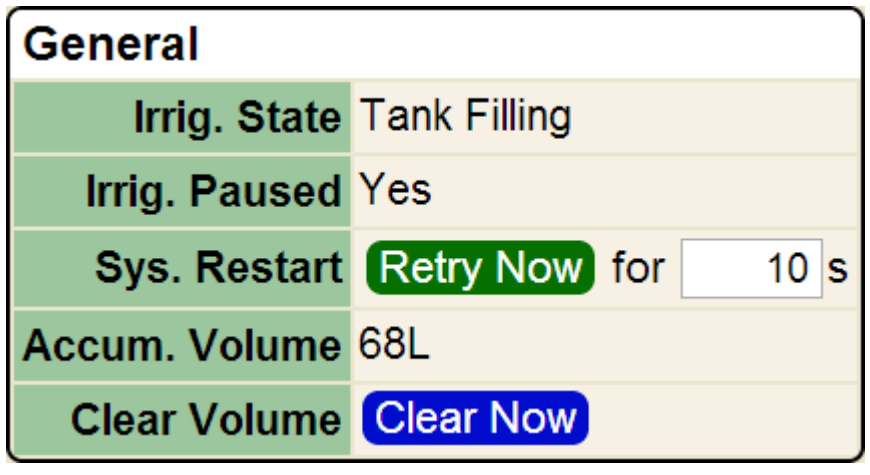
The raise output is used to supply water that will effectively raise the nutrient level of the tank, this is can be connected to a pre-dosed water supply or a Dam the collects run off.

Name: Name given to output for identification purposes.

Output: Address of the output the valve is physically wired to.

Settings

General



Irrig. State: Current state of the irrigation system. This can be driven from multiple installed functions

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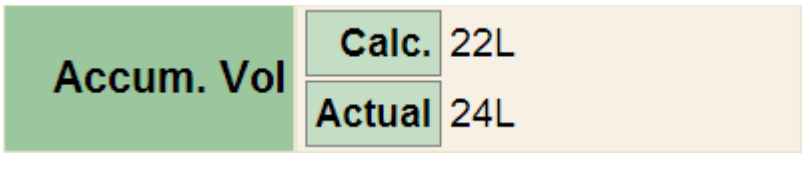
Irrig. Paused: Is the irrigation system currently in a paused state.

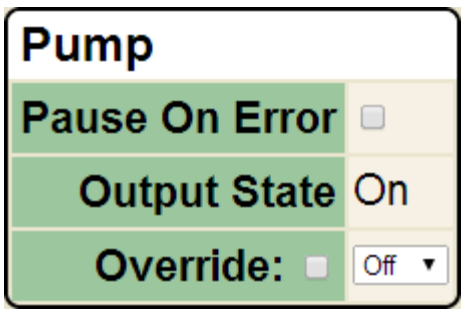
Sys. Restart: If the system is currently paused this box will be displayed, if the irrigation system is in a state in which it might need to be resumed to try and clear this. If a flow error or pump error has occurred the system needs to start running again in order to check if the error conditions have been resolved. Pressing the retry now button will unpause the system and hold it unpaused for the time specified in the box. After this time if an error conditions still exist on the system it will return to the paused state.

Accum. Volume: Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.



Clear Volume: This will immediatelty set the Accumulated volume reading back to zero. This will happen to both the calculated and actual volumes on the system.

Pump



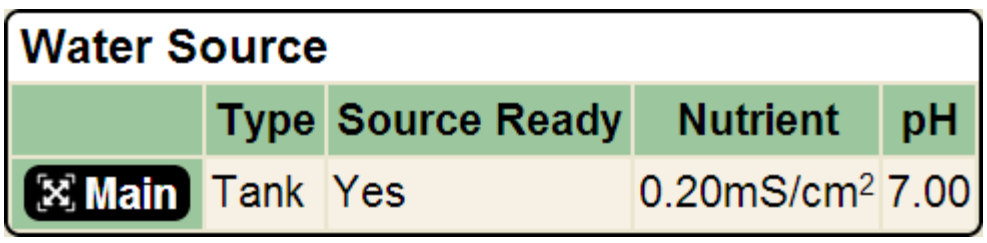
This box will be displayed only if a Main pump has been installed on the configuration page.

Pause On Error: If communications to the output module that controls the pump or the pump switch has been set to manual on this module, an error will be generated by the system. Ticking this box means that when an error like this occurs the system will be paused and stop all irrigation.

Output State: Current state of the pump output.

Override: Ticking this box will override the output to the state specified in the drop down box.

Water Source



Depending on the type of water source configured on the system the additional options displayed on the expanded menu will differ. The common readings are displayed here, pressing the expand button will bring up extra settings boxes.

Type: Current type of water source configured.

Ready: Is the water source ready. Note Town Water sources are always ready.

Nutrient: Current nutrient level of the water source.

pH: Current pH level of the water source.

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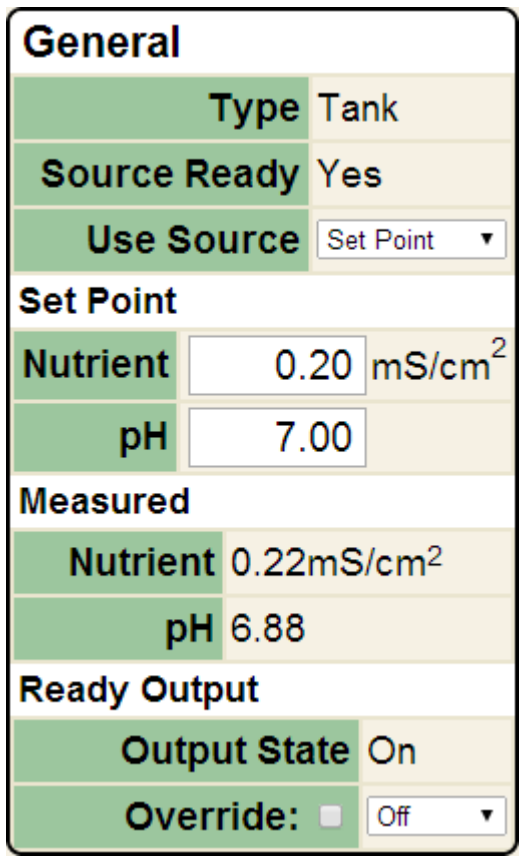
General



The general tab the same for all types of water sources, it is the only options box available for a Town Water and Main Tank source.

Type: Type of water source.

Source Ready: Is the water source currently ready this can be set from a number of places depending on the type configured. For a Tank and Blending tank the locate ready when above is responsible for that, also the failsafe setting. When using main tanks the same settings will drive this value but are based on the main tank ones. A town water source is always ready.

Use Source: Certain dosing alogrithms in the system required a starting point in order to operate correctly. This starting point is the water nutrinet and pH levels. These can be be either from a set point or measured using a Source EpM sensor group.

Set Points

Here both a nutrient and pH source set point can be configured.

Measured

The current nutrient and pH levels being measured from the Source EpM group are displayed here.

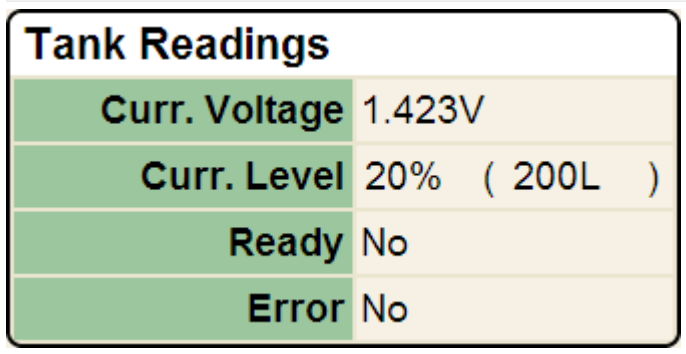
Ready Output

The ready output sub box will only be displayed if a ready output has been configured on the water source.

Output State: Current output state of the ready output.

Override: Ticking this box will override the ready output to the state specified in the drop down box.

Tank Readings



If a water source is configured as a tank or blending tank this reading box will be displayed, it contains the major readings relating to the tank.

Curr. Voltage: Voltage being reported on the Moist input of the sensor selected to be the source for this tank.

Curr. Level: Based on the size and voltage levels configured for this tank the Curr. Voltage level is converted into a percentage full value as well as a approximate litre value.

Ready: is the tank ready.

Error: Is the an error on the tank.

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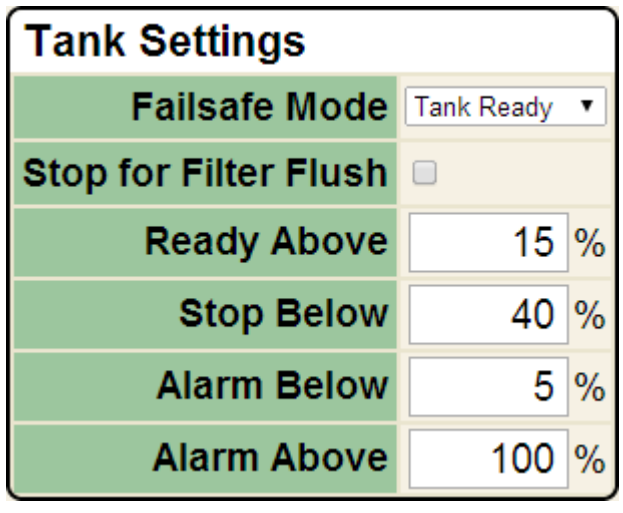
Tank Settings



If a water source is configured as a tank or blending tank this settings box will be displayed, it contains the major settings for a tank.

Failsafe Mode: If the voltage reading is ever lost the system has no idea what level the tank is at, if a water source is not ready the system will not be above to irrigate. Setting this to Ready means that if the voltage level from the sensor is ever lost the tank will instantly become ready, meaning that irrigation can still happen insuring plants can still be watered. If this is set to Delay the system will become paused as the water source will no longer be ready for irrigation's.

Stop for Filter Flush: If a filter flush functionality has been configured on the system it maybe be necessary to stop the tank from filling during this operation. If this box is ticked and a filter flush is started the tank will stop filling operations.

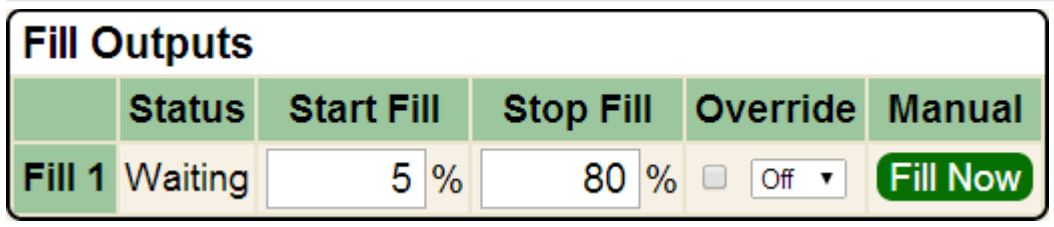
Ready Above: Once the tank has calculated it is at least this full the water source will become ready an irrigation's are allowed.

Stop Below: If the tank ever drops below this level the water source will become unavailable and irrigation's will not be allowed. The different ready and stop levels are used because the tank might usually fill a lot faster than it is irrigated out. This means a tank can be ready sooner and only stop if it drop below a critical level.

Alarm Below: If the tank ever drops below this percentage full an alarm event will be generated by the system.

Alarm Above: If the tank ever goes above this percentage full an alarm event will be generated by the system. If a tank is configured correctly a percentage over 100% should not be possibly if it does the tank configuration might need to be adjusted to insure the reported voltage is converted into a true representation of the fill level.

Fill Outputs



If a water source is configured as a tank type it displayed this setting box.

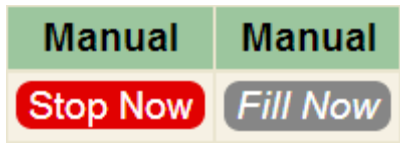
Status: Current status of the fill output.

Start Fill: When the tank level drops below this value the fill output will be turned on.

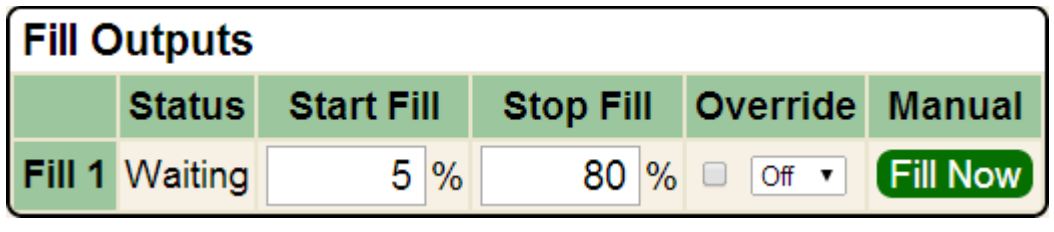
Stop Fill: Once the tank level is above this value the output will be turned off.

Override: Ticking the box will force the output to the state specified in the drop down box.

Manual: When a fill output is in the waiting state it can be manual triggered for filling by Pressing the fill now button, this will turn on the output until the tank level reaches the stop fill level or the Stop Now button is pressed. If the fill output is currently running the stop now button will be displayed. Pressing this button will cause the fill output to turn off until the tank level drops below the start fill level or the Fill Now button is pressed. If an error has occurred in which it is not possible to manual run the output this button will be disabled.



Fill Flow Alarm



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If a water source is configured as a tank type it displayed this setting box.

Fill Flow: Current flow rate being measured on the fill flow sensor configured.

Alarm if: If the tank is currently filling e.i. any fill output is currently on and the flow being measured on the meter drops below the set level for the specified amount of time and alarm conditions has occurred.

Stop Fill on Alarm: Ticking this box means that if the above alarm conditions are meeting all fill outputs will be stop until this is cleared.

Alarm State: Current state of the alarm.

Stop Output: Has the alarm caused the fill outputs to stop. If this is true the fill outputs state will also change to indicated this.

Alarm State	Alarm Stopped
Stop Outputs?	Yes
Clear Stop	Clear Now

Clear Stop: Pressing the clear now will remove the stop conditions placed on the fill outputs by the alarm. The tank will return to normal operation. This button will only appear if an alarm condition has occurred which stopped the outputs from operating. When the alarm conditions arises the fill outputs status will change to indicated this and the manual buttons will be disabled.

Status
Stopped (Alarm)

Blending Control

Blending Control

Mode	Filling
Blend Above	50 %
Desired Nutrient	1.50 mS/cm^2
Deadband	0.50 mS/cm^2

The blending control box will only be displayed if a water source has been configured as a blending tank. The main blending control of the tank is done by the use of a desired nutrient level setting as well as a deadband. The tank also has a blend above setting which is the level the tank must get to before lower and raise outputs can start to be turned off. Below this level the tank is in fill mode where both output will be on in order to fill the tank as fast as possible. Once a tank has reached it blend level it will use the current nutrient level in order to control the outputs. If the current nutrient level drops below the desired level the raise output will be switched on, if the nutrient level reaches a point which is equal to the desired level plus the deadband the raise output will switch off. If the nutrient level is above the desired level the lower output will be switched on, if the level equal the desired level minus the deadband this output will be switched off. This control method means that both output are usually constantly on and will only switch off if extremes are meet. This is because not only are we trying to maintain a desired level of nutrient with in the tank, we are also try to fill it.

Mode: Current mode of the blending tank. If the tank is currently filling both the lower and raise fill output are on this is to give an even mix of both as well as fill the tank as fast as possible. Blending of the two sources only happens when the tank is sufficiently full.

Blend Above: When the tank level has reach a certain level blend of the water sources can occur.

Desired Nutrient: Desired nutrient level of the water source. This is the main setting that controls the lower and raise outputs.

Deadband: The amount the nutrient level must change by before a change in the fill outputs will occur.

Fill Outputs

Fill Outputs

	Name	Status	Override
Lower	Town	Filling	☐ Off
Raise	Dam	Filling	☐ Off

The blending control box will only be displayed if a water source has been configured as a blending tank.

Lower

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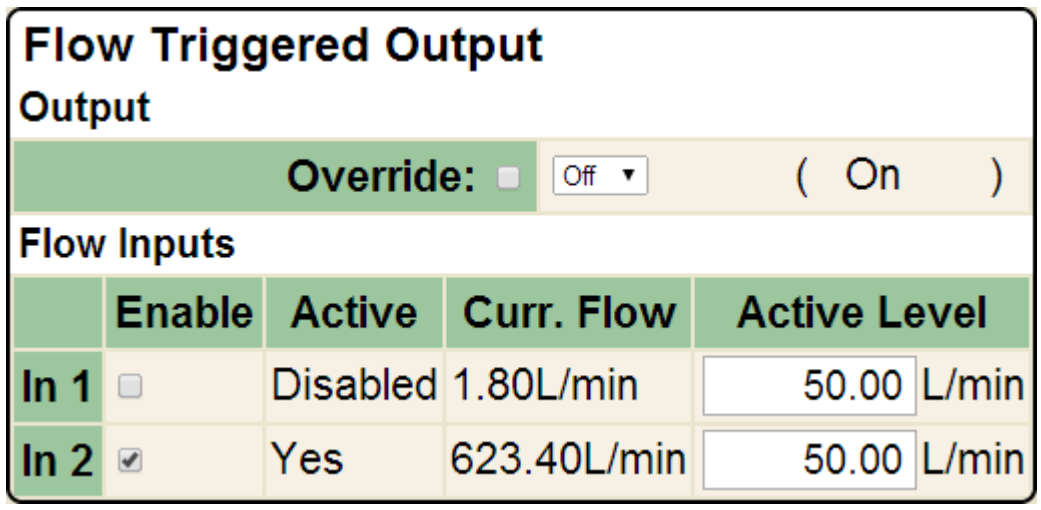
- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Raise

- **Name:** The current name given to the output for identification purposes, this is set on the configuration page.
- **Status:** Current state of the fill output.
- **Override:** Ticking this box will override the output to the state specified in the drop down box.

Flow Triggered Output



Override: Ticking this box will override the output to the state specified in the drop down box.

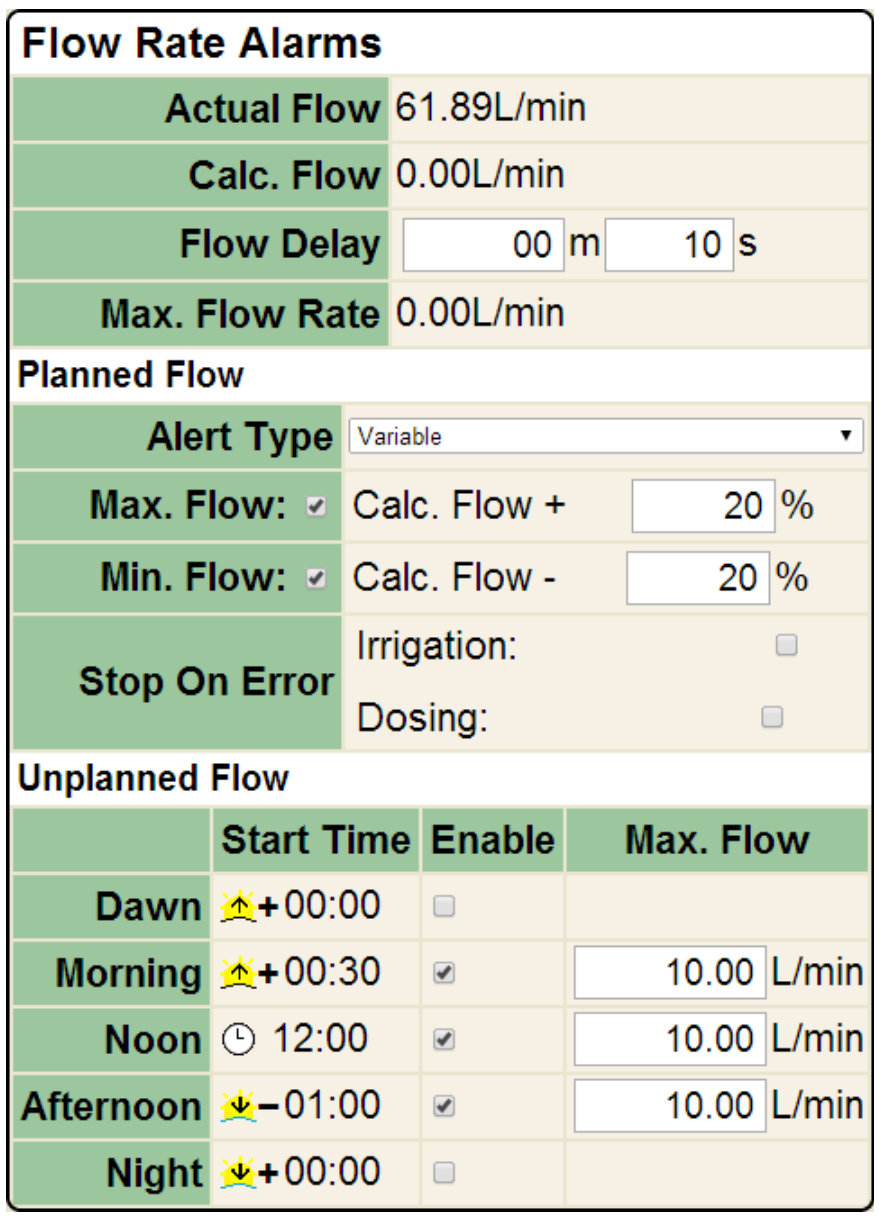
Enable: In order to use a configured flow input as a trigger for this output it must be enabled.

Active: Has the current flow level meet the required level in order to turn on the output.

Curr. Flow Current flow rate being report by the configured input.

Active Level: The level the flow must reach before it is deemed to actually be active and the output to be turned on.

Flow Rate Alarms



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This box will on be visible if the system has a mesaure flow meter properly configured. Though there is a separate alarms tab located on the settings page that is used for generic alarm settings rather than specified levels. An irrigation system has two flow rate alarms that become active under different conditions (Planned and Unplanned).

Actual Flow: Current flow rate being measured by the system.

Calc. Flow: The current flow that should be present on the system derived from the station flow rate settings.

Flow Delay:: When a system begins to water it can take a small amount of time for the pump to spool up. This lag can also happen when the flow is changing due to stations size. This setting lags the measurement by this factor to stop incorrect alarms being generated.

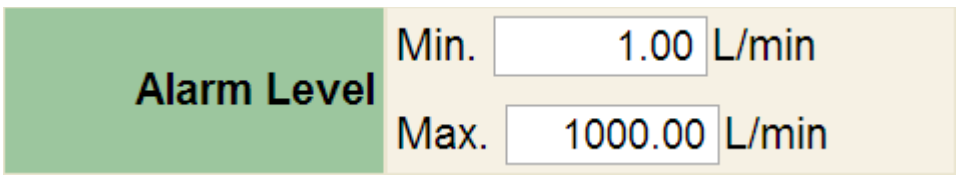
Max. Flow Rate: Current maximum flow rate expected on the system given its current state of operation.

Planned

A Planned flow alarm becomes active when we are expecting flow to be present on the system e.i a irrigation has become active. The system can be configured to generate both minimum and maximum flow rate alarms based on the flow of the system. The flow rate variable configured for each station is compared to the current flow rate being measured if this various by a certain amount an error is said to have occurred and an alarm should be generated. When an event such as this occurs it is possible to stop the Dosing modules on the system if installed and or stop the irrigation completely.

Alert Type: The type of alarm used for planned flow.

- ***Disabled:*** No planned flow alarms will be generated.
- ***Variable:*** The minimum and maximum flow levels vary depending on the calculated flow rate of the system.
  Max. Flow: Ticking this box means that the maximum planned flow rate alarms are enabled on the system. If the actual flow is ever above the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Max level will still be used by this will be set to a range that cannot be reached by a irrigation system.
  Min. Flow: Ticking this box means that the minimum planned flow rate alarms are enabled on the system. If the actual flow is ever below the calculated flow by the set percentage for a certain amount of time, generate an alarm. Note that the Maximum and Minimum alarms are driven from the same alarm source so even if this is disabled a Min level will still be used by this will be set to a range that cannot be reached by a irrigation system.
- ***Set Levels:*** The minimum and maximum flow level are fixed and the actual flow rate is compared to these directly.



Min.: Minimum flow rate allowed on the system when irrigating. If the actual flow drops below this for a certain time, generate an alarm.
Max.: Maximum flow rate allowed on the system when irrigating. If the actual flow rate goes above this for a certain time, generate an alarm.

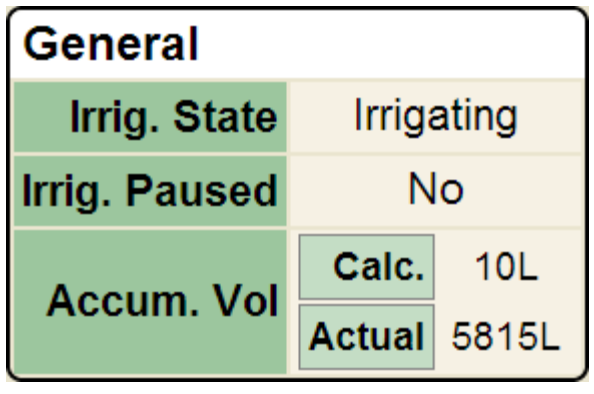
Stop On Error: When an error occurs on the system it is possible to stop either the Dosing Modules or entire irrigation system.

Unplanned Flow

A Unplanned flow alarm becomes active when we are not expecting flow to be present on the system e.i when there is no active irrigation. The system can be configured to enable this alarm per time period. It is also possible to set the level of flow required per time period in order to validate the alarm. If the actual flow rate is above the Max.Flow level for a specific amount of time and it is enabled an alarm will be generated. Note the time period enable needs to be saved in order to see and edit the Max. Flow variable.

Readings

General



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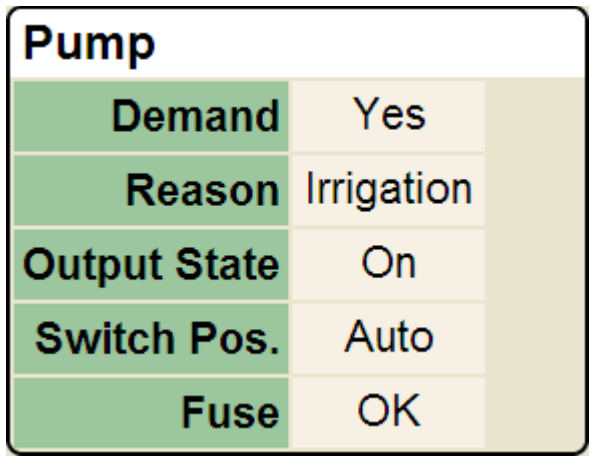
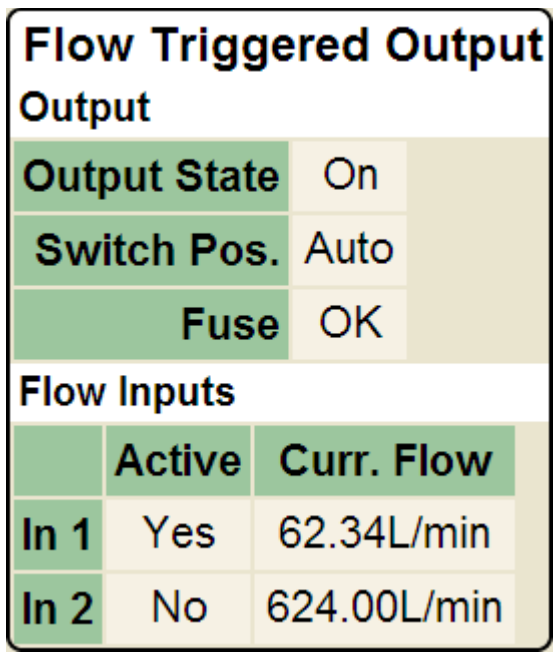
Field	Description
Irrig. State	Current state of the irrigation system. This can be driven from multiple installed functions
Irrig. Paused	Is the irrigation system currently in a paused state.
Accum. Volume	Current accumulated volume since midnight, note that this is based on the calculated flow rate derived from each station in the system when they are being irrigated. If a flow meter is installed this box will display both the Calculated Volume and the Actual Volume.

Pump



Field	Description
Demand	Is there current;y any demand in the system the means the pump should be running.
Reason	This field is only visible when a demand is active there are only a few source that can demand the pump to run, *Irrigation:* an irrigation is active on the system. *Filter:* The run pump on filter flush setting has been selected and the system is currently flushing. *Batch:* The batch system is calling for the pump to be active, this means the run pump while filling or stirring settings have been selected and the batch module is currently performing one of these actions.
Output State	The current state of the output for the pump, *On* or *Off*
Switch Pos	The switch position of the pump output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Flow Triggered Output



Field	Description
Output State	The current state of the output, *On* or *Off*
Switch Pos	The switch position of this output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*
Active	Is the configure input sources flow reached the desired level to turn on the output.
Curr. Flow	Current flow being report from the configure sensors for this flow input.

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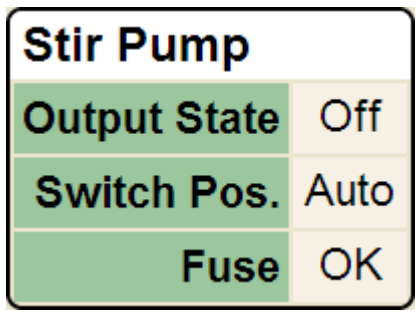
Stir Pump

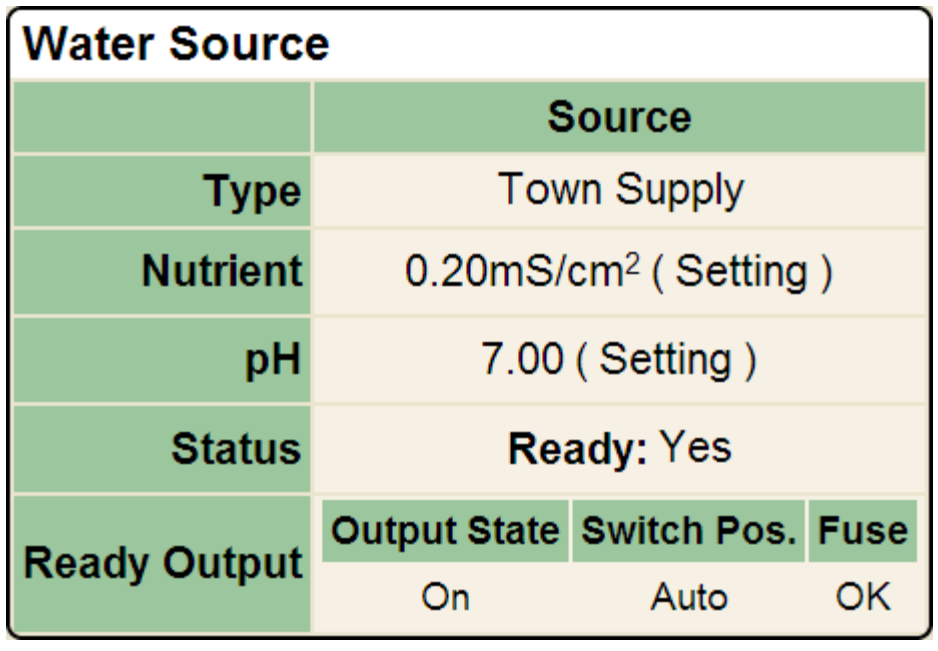


A stir pump can only be configured on an Inline dosing irrigation system and has been properly configured under the Configuration -> Dosing section. It will become active when the system is running an irrigation in order to help stir nutrient and pH injections through the output going water.

Field	Description
Output State	The current state of the output for the stir pump, *On* or *Off*
Switch Pos	The switch position of pump output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Water Source

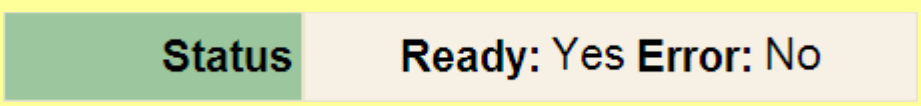
General Readings



Depending on how a water source is configured the displayed information in this box will vary. Above visible readings for a town water source these are common readings among all types of sources.

Field	Description
Type	The current type of the configure water source, *Town Water* , *Tank* , *Blending Tank* or a *Main Tank*.
Nutrient	The current water source nutrient level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
pH	The current water source pH level and whether it is supplied by a *Setting* or an actual sensor *Reading*.
Status	Whether the water source is ready. Note a town water source is always ready.
Ready Output	If a ready output has been installed on the water source the outputs information will become visible here. **Output State** The current state of the output for this injector, *On* or *Off*. **Switch Pos** The switch position of this injectors output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

If a water source has been configured as a tank or blending tank the status box mentioned above will contain a an error reading as well to indicate whether the current tank has an error condition present.



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Tank Readings

Curr. Level	19% (190L)		
Outputs		**Fill 1**	**Fill 2**
	Status	Filling	Filling
	Output State	On	On
	Switch Pos.	Auto	Auto
	Fuse	OK	OK

Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field all the current readings for each fill output configured on tank are displayed. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the output for the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

Blending Tank Readings

Curr. Level	51% (510L)		
Outputs		**Lower**	**Raise**
	Name	Town	Dam
	Status	Running	Running
	Output State	On	On
	Switch Pos.	Auto	Auto
	Fuse	OK	OK

Field	Description
Curr. Level	The current calculated level in the tank this is based on the voltages and tank size settings configured for this water source.
Outputs	Within this field the lower and raise fill output readings are displayed. **Name** Unique identifier given to this output. **Status** Current state of the fill output *Running*, *Waiting*, *Errors*. **Output State** The current state of the fill output, *On* or *Off*. **Switch Pos** The switch position of this fill output, *Manual* or *Auto*. **Fuse** The state of the fuse on the Output Module, *OK* or *Blown*.

Flow Rate

Flow Rate	
Actual Flow	62.34L/min
Calc. Flow	80.00L/min
Planned Flow	
Enabled	Yes
Min. Flow Rate	64.00L/min
Max. Flow Rate	96.00L/min
Unplanned Flow	
Enabled	No
Max. Flow Rate	10.00L/min

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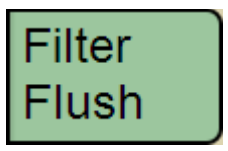
For this box to be visble a flow meter must be correctly installed and configured on the irrigation system.

Field	Description
Actual Flow	Current flow rate being measured from the configure sensor source.
Calc. Flow	Current calculated flow the system is expecting to see based on its current state.
Planned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Min. Flow Rate	The minimum flow the system is allowed to have with generating an alarm condition, this is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on the currently active irrigation settings for both the station flow rate and alarm levels.
Unplanned Flow	
Enabled	If planned flow alarms are currently enabled on the system.
Max. Flow Rate	The maximum flow the system is allowed to have with generating an alarm condition, his is based on alarm level settings.

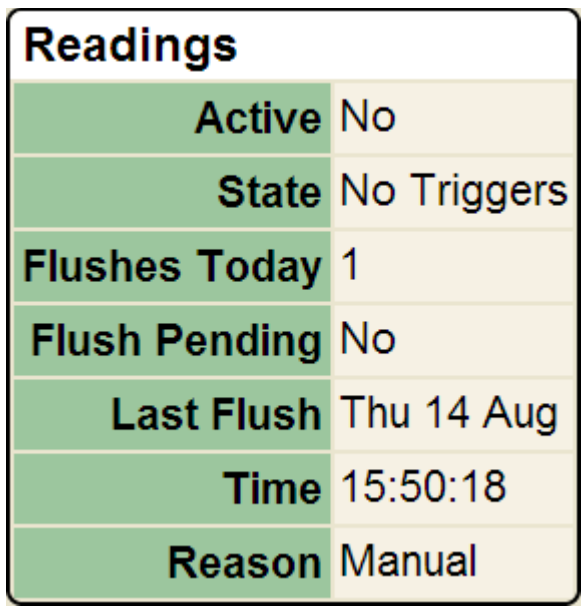
Filter Flush



If a filter flush is installed on the system a separate tab will be appear on the tertiary menu. When a filter flush is occurring the system is running water backwards through the pump. This means that irrigation's will be paused or unable to start during this period.

Settings

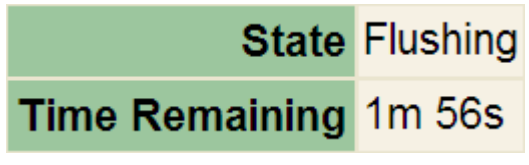
Readings



Active: Is the filter flush currently active.

State: Current state of the filter this can differ from the active reading and reflects other aspects of the filter flush system.

Time Left: Time remaining for the active filter flush cycle, this will only be displayed if the system is currently performing a filter flush.



Flushes Today: Number of flushes that have occurred today since midnight.

Flush Pending: If there is a flush pending the trigger source will be displayed here, a trigger can only be pending if the use of a flush window otherwise flushes will happen whenever they are demanded. If multiple triggers have occurred before the filter flush can run, the sources will be listed here.

Last Flush: Date of the last filter flush.

Time: Time when the last flush finished.

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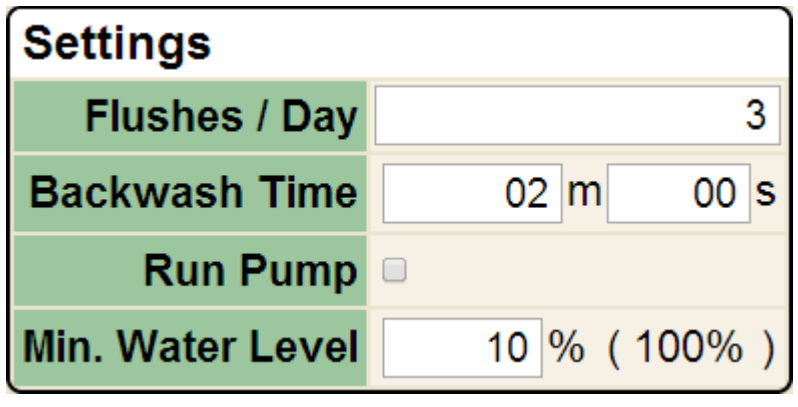
Reason: the trigger source for the last flush.

Settings



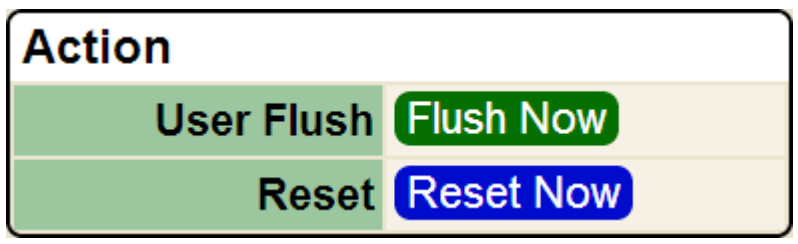
Flushes / Day: This sets the amount of flushes allowed per day, this is a maximum set point that can not be exceeded by any of the flush triggers except for a manual flush.

Backwash Time: The time it takes to run water backwards through the filter in order to flush it properly. This is time is sometime giving by the filter manufacturer. It may also be specified as a volume.

Run Pump: If this box is ticked when a filter flush becomes active the main system pump will also be turned on.

Min. Water Level: If a tank is the source water for the flush it might required more water then what is currently in the tank. Using this value it is possible to specify the amount of water that must be present from the water source in order to run a flush, otherwise it will not happen.

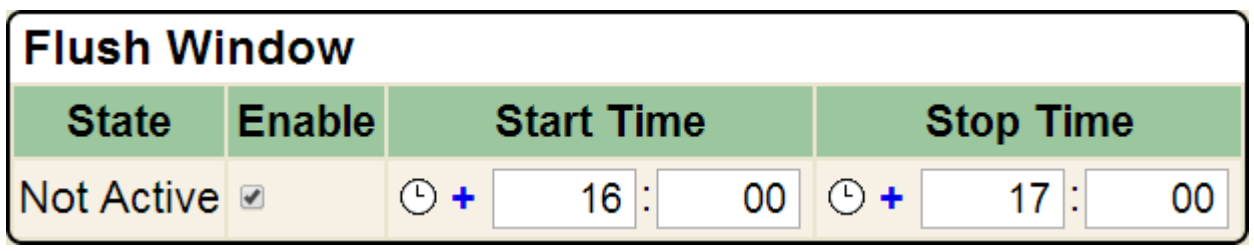
Action



User Flush: Triggers an immediate filter flush regardless of the state, once a filter flush has been activated this button will change to a cancel button, which will immediately stop the active filter flush.

Reset: Pressing the reset button will reset all automated triggers back to zero.

Flush Window



The flush window enables a set time of day for automatic flushes to occur. If a window is enabled the volume and interval triggers can only run between the time specified.

State: Current state of the window.

Enable: If a flush window is to be used on the system this value must be ticked.

Start Time: Time when the window starts, this can be a set time or an offset from sunrise/sunset.

Stop Time: Time when the window ends, this can be a set time or an offset from sunrise/sunset.

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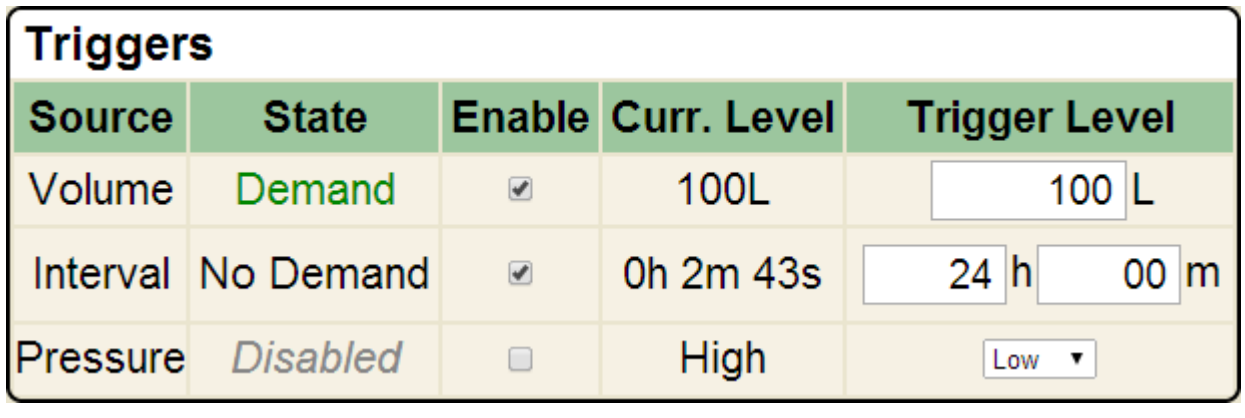
Triggers



There are three sources that can trigger a filter flush within an irrigation system. Both the Volume (actual only) and Pressure triggers required sensor input, if they are not installed a No Sensor error message will be displayed. The Volume and Interval triggers are bound by the flush window, so will only trigger during the window if enabled. All the triggers are also bound the number of flushes per today as well as the water source level. If any of these conditions are not meet but a trigger is demanded a Demand message will be disabled. Once a flush has completed the current levels will be reset, except for the pressure level since that is driven directly from a sensor. If any of the triggers are *Disabled* they will not be able to trigger.

Volume
A volume triggered filter flush is driven from either the calculated or measured volume on the system. If the measured volume is being used a flow meter must be correctly configured on the system.

Interval:
This is a simple time based triggered once a certain amount of time has passed since the last filter flush a new trigger will be generated.

Pressure
This is driven directly from a pressure sensor installed onto an EpM sensor within the system, this must be properly configured for this trigger to work.

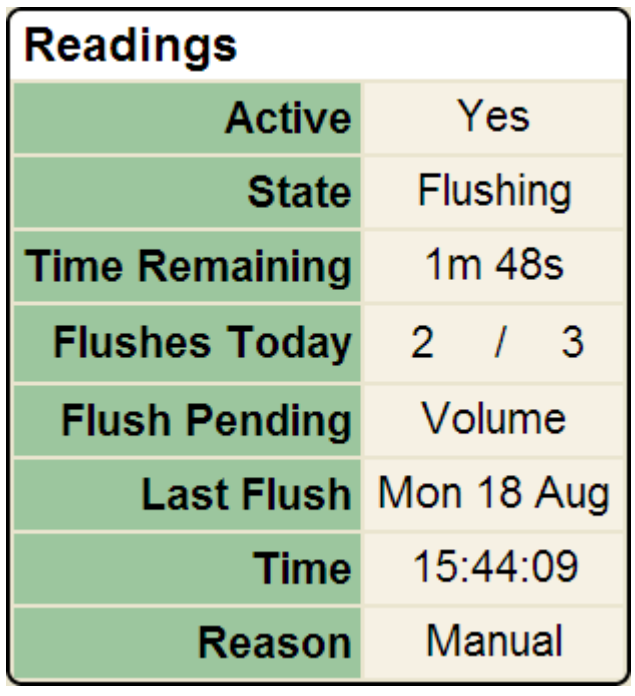
State: Current state of the trigger.

Enable: This box must be ticked if the source is to be used as a trigger.

Curr. Level: Current reading of the source.

Trigger Level: Level the source reading is compared to in order to generate a trigger.

Readings



Field	Description
Active	Is a filter flush currently being performed by the system
State	Current state of the filter flush module.
Time Remaining	This reading will only be displayed if a filter flush is currently active on the system. It displays how long is left until the flush cycle has completed. This is reset to zero when the system reaches its end of day.
Flushes Today	Number of flushes that have occurred today out of the maximum total allowed.
Pending Flushes	If a flush window has been configured on the system or the number of flushes has been exceeded any triggers will be queued until it will be allowed to run again. The source of this queued flush will be displayed here.
Last Flush	Date of last flush performed by the system.

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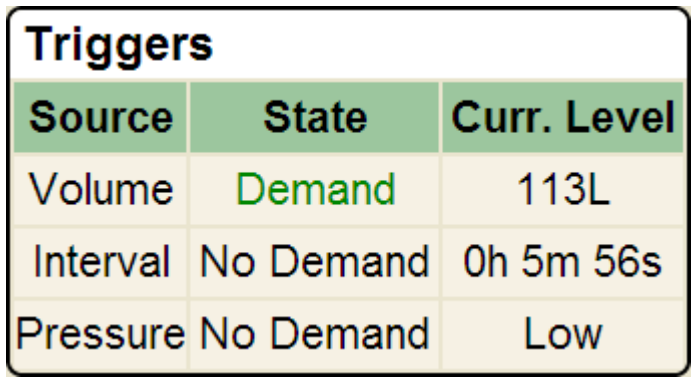
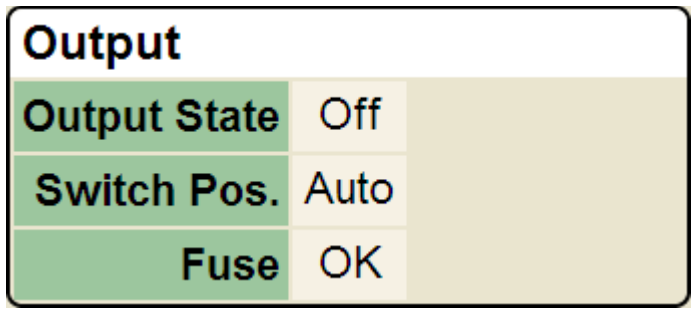
Field	Description
Time	Time of the day the flush occurred.
Reason	The trigger reason for this flush.

Triggers



Field	Description
Volume	State of the volume trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Volume	State of the interval trigger on the filter flush module. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level will not be reset until the flush has happened.
Pressure	State of the pressure trigger on the filter flush module, this will only be displayed if the pressure trigger has been correctly set up on the water system configuration page. The trigger level for this is set under the settings page. Once triggered the state will change to demanded. Note that the Curr. Level is driven directly from a sensor input and will only change based on physical feedback from the pressure sensor.

Outputs



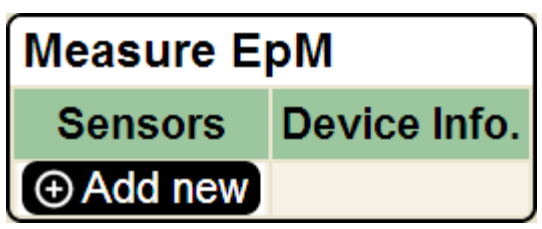
Field	Description
Output State	The current state of the filter flush output, *On* or *Off*
Switch Pos	The switch position of the output, *Manual* or *Auto*
Fuse	The state of the fuse on the Output Module, *OK* or *Blown*

Sensors

Each irrigation system can have a three different groups of sensors used for ob

Configuration

Measure EpM



This is the group of readings designated for the main readings of the system. This group reports the Main Nutrient, pH and Flow for the system.

After adding a new Remote EpM to the sensor box the Sensors field and the device info. box will change.

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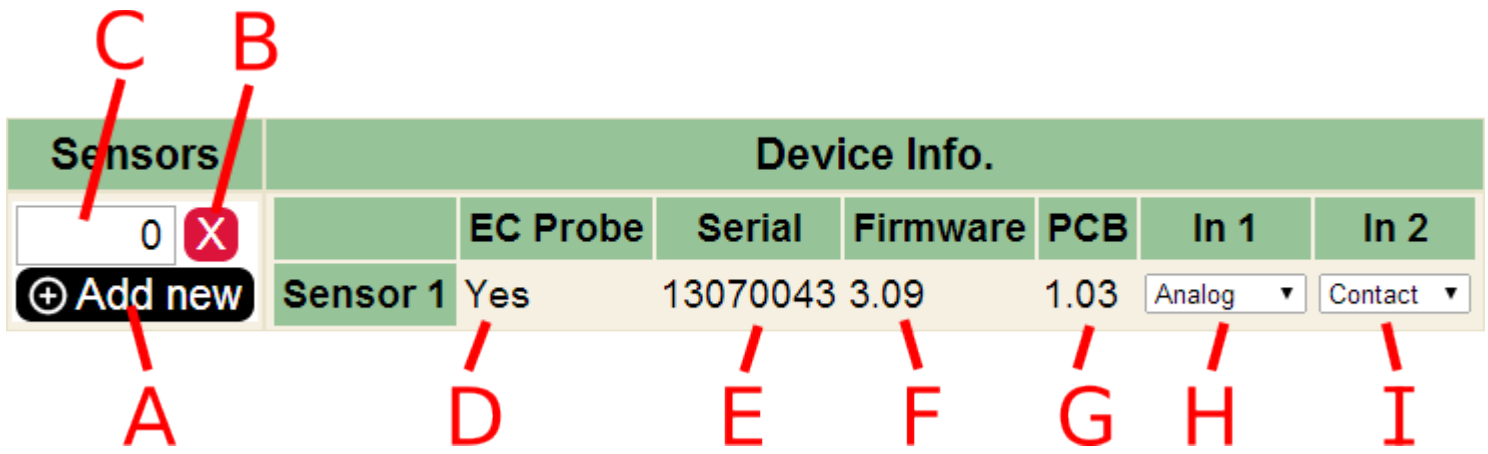
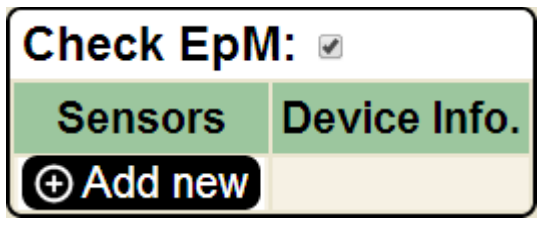


Annotation	Name	Description
A	**Add new button**	Adds an EPM sensor
B	**Delete button**	Deletes an EPM sensor
C	**Sensor address**	The address of the sensor. Each box must be populated with the corresponding address of the EpM device
D	**EC Probe**	Does the Remote EpM currently have an EC Prove attached?
E	**Serial**	Serial number of the device connected under that address
F	**Firmware**	Current version of the firmware this device is running
G	**PCB**	PCB version of the device
H	**In1**	• **Contact:** Input 1 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to 5 - 10V when contact is made • **Analog:** Analog voltage is connected to input 1 of sensor • **Moisture:** Moisture probe is connected to Input 1 of sensor
I	**In2**	• **Contact:** Input 2 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to ground when contact is made • **Flow:** Input 2 is a flow meter input, again this should be pulled to ground when contact is made for correct operation

Sensor information is only available once the configuration has been activated by pushing the **Activate** button

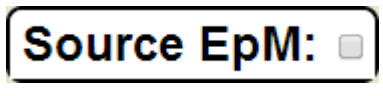
Check EpM

The Check EpM group is used for mainly error checking against the Measure EpM reading. It can also provided general contact closure inputs as well as analog inputs.



Check EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Source EpM



The Source EpM group is mainly used for input information to the system. I can be used to measure the incoming nutrinet and pH level of the systems water supply. It can also provided general contact closure inputs as well as analog inputs.

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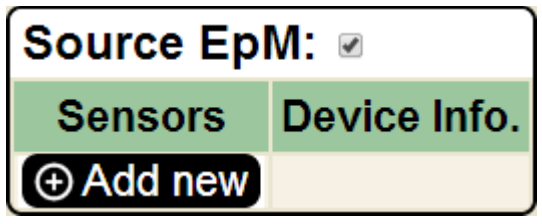
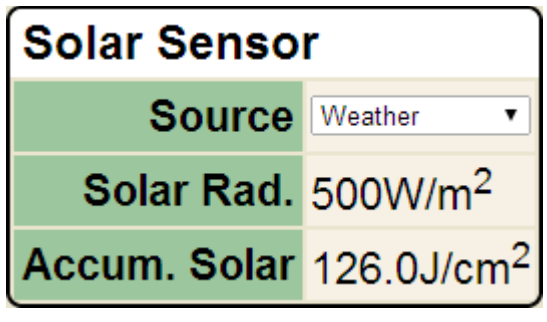


Source EpM's are configured the same as the Measure EpM's described above. The installed tick box located in the group heading must be ticked in order to display the configuration information.

Solar Sensor



An irrigation system can have a solar source assigned to it which can be used through the system.

Source: Here the solar source can be specified, depending on which source is selected additional configuration options will be displayed.

- ***Weather:*** The systems solar information will be taking from the weather station.

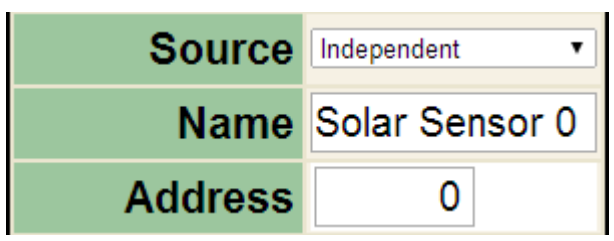
> A Weather stations needs to be installed and properly configured for this option to be used correctly. See section config weather for information on this.

- ***Independent:*** The system uses the solar reading from a independent solar sensor.
- ***Compartment:*** The system will use the solar information from a specific compartment.

Solar Rad.: Current level of solar radiation that is being measured by the selected source.

Accum. Solar: Accumulated solar radiation since last End of Day.

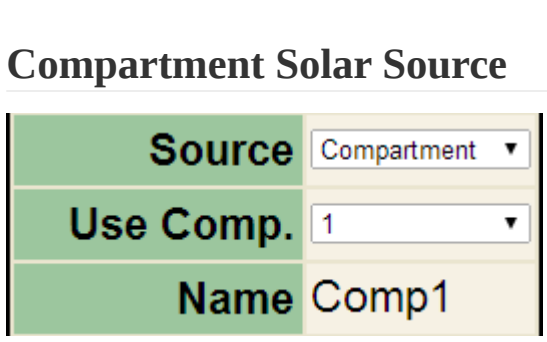
Independent Solar Source



Name: Text can be entered in this field to help identify the solar sensor attached to the system.

Address: The address of the rotary switch the desired solar sensor is set to.

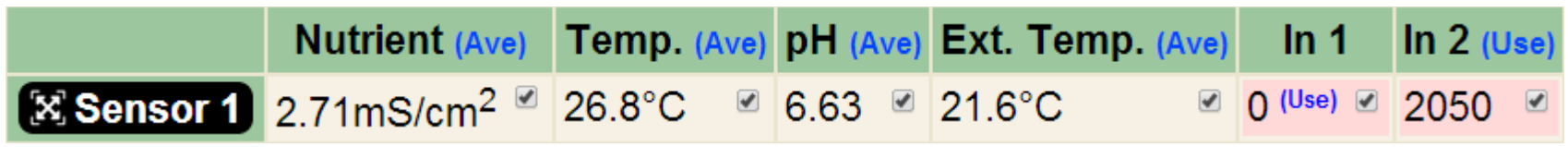
Compartment Solar Source



Use Comp.: The number of the compartment that is to be used be system in order to get solar information must be entered here. In order to use a compartment as a solar source the compartment must be probably configured see configuring climate section for information on this.

Name: Each compartment can be configured to have a name, this will be displayed here to help ensure the correct compartment has been selected as the solar source.

Overview



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The black button that appears in the row heading of the table is an expansion button, this button is given the name of the sensor number added to the system. When this button is pushed additional settings for each sensor will be displayed.

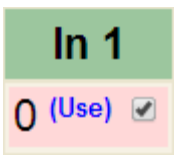
Field	Description
Nutrient	The current nutrient reading from the sensors. If this reading is 0.00 or XX check the connection of the EC probe to the Remote EpM sensors.
Temp.	Each Autogrow EC probe contains a temperature sensors which temperature is displayed here.
pH	Current pH being measured by the probe. Note that due to the nature of a pH measurement even without a probe connected a value can be displayed here.
Ext. Temp.	Current temperature being measured using the pipe temp sensor wired into the Temp pin of the Sensors B Connector. If a probe is not installed this temperature will appear of XX if a sensor is installed and XX is being displayed check the wiring of the probe.

In 1 & 2 Values

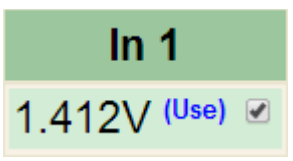
The values displayed in the Input 1 & Input 2 space will differ based on the In 1 setting on the configurations page, this needs to be set correctly to match the desired input signal. Since the type of variable can differ with the same column in the table each specific type of reading will be displayed in a different colour within the cell.

In 1:

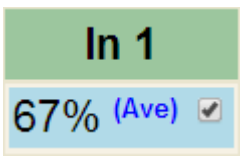
- **CC Count 1:** Current count to contact closure input wired into Moist pin on connector B, the Contact options must be selected under configuration for this to be displayed.



- **Analog:** Current analog voltage being measured by the sensor. This will only be displayed if the sensors In1 value on the configuration page is set to Analog.

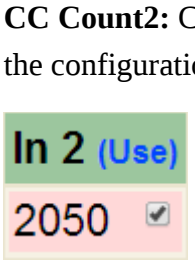


- **Moisture:** Current moisture level being measured by the sensors, the moisture option must be selected under configuration for this to be displayed.

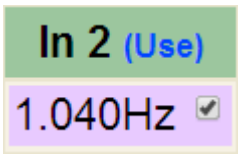


In 2:

- **CC Count2:** Current count of the CC input on the senosrs, this will only be displayed when contact option is selected under the In2 setting on the configuration page.



- **Flow Rate:** The raw flow rate in Hertz (frequency) that is being measured on the sensors. This is in relation to how many pulses a second the sensors is receiving (1 Pulse a second = 1 Hz). The Flow rate option must be selected under the In 2 setting on the configuration page for this to be displayed.



Some or all of the above values are Average Vars.

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The addition of the above text and tick box means a variable is part of an averaged set. If the tick box is ticked this means the current reading and all other tick ones will be averaged together. This is useful in order to gain on overall sample of a particular reading. Any invalid readings (e.g. *XX°C*) are omitted from the average even if the box is ticked.

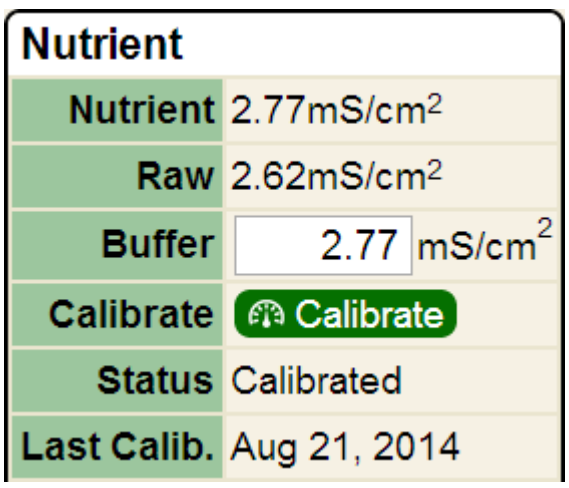
Some or all of the above values are Use Me Vars.

The addition of the above text and tick box means a variable is part of an use me set. If the tick box is ticked this means the current reading will be used as the main reading from the group of sensors. This is useful when multiple sensors within a single group are installed but only one is used for the specific reading. If multiple of the same use me vars are ticked, the system will use the value from the lowest sensor number as the reading (e.g. *Sensor 0 RH* will be used over *Sensor 1 RH*).

Additional Options

Each sensor can be individually calibrated in order to achieve the most accurate readings. Pressing the See All button will return you to the sensors overview page where other sensors additional options can be navigated to.

Nutrient



Field	Description
Nutrient	Current value of the nutrient, this is the value after the reading has been passed through the calibration it is the one that will be added to the average.
Raw	This is the raw reading coming from the sensor before calibration. This can differ from calibrated reading by quiet a lot. This value is displayed in order to give an indication of whether a new calibration should be performed.
Buffer	This is the calibration solution being used, default is 2.77mS/cm^2. This value can be changed to any value of buffer solution.
Calibrate	Pressing the Calibrate button will calibrate the current nutrient reading to the buffer solution set.
Calib	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Nutrient Calibration Procedure

For each Remote EpM sensor within a group that is to be used for nutrient measurement it is recommended to calibrate the probes once a month.

- Clean & rinse the nutrient probe face
- Place the probe into the calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

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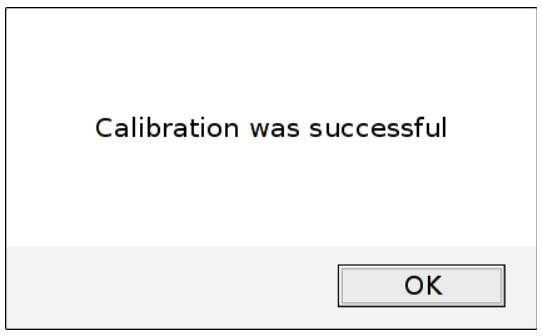
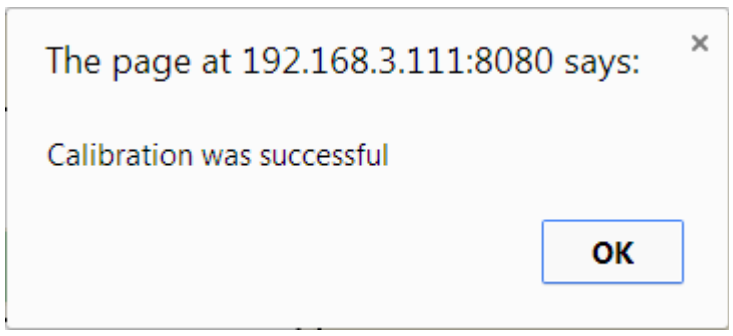
Nutrient	2.62mS/cm^2
Raw	2.62mS/cm^2
Buffer	2.77 mS/cm^2
Calibrate	Calibrate
Status	XX
Last Calib.	

- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the nutrient and the temperature to stabilize (Recommended 5 Minutes).





- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

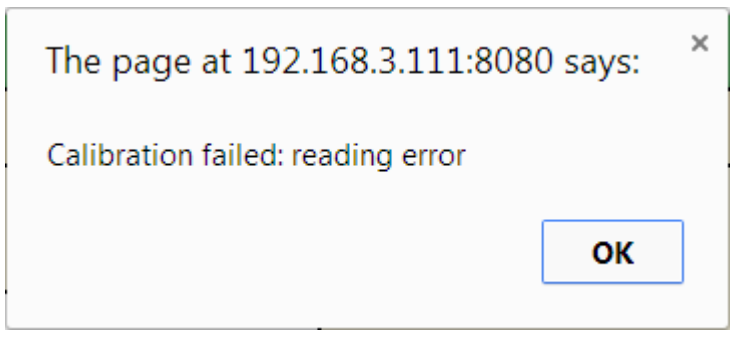
Nutrient	2.77mS/cm^2
Raw	2.62mS/cm^2
Buffer	2.77 mS/cm^2
Calibrate	Calibrate
Status	Calibrated
Last Calib.	Aug 21, 2014

Calibration Errors

- **No Probe**

Status	No Probe

No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.



- **Out of Range**

Status	Out of Buffer Range

Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-

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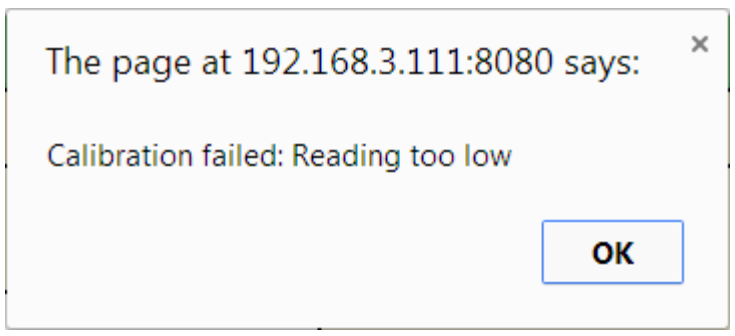
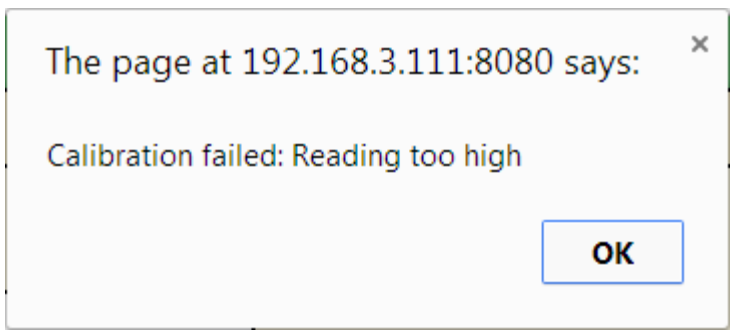
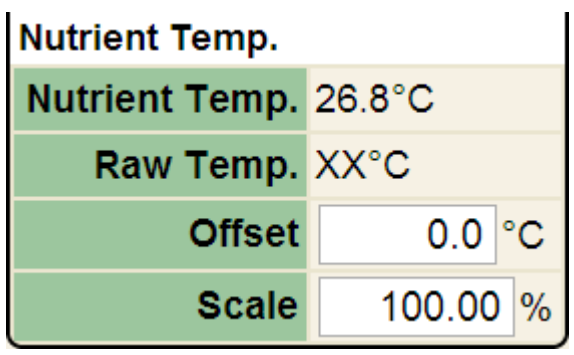
clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.



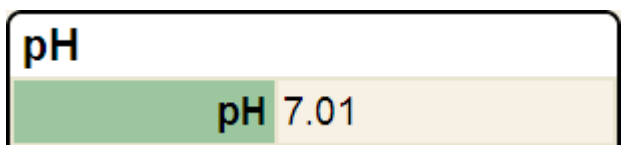


Nutrient Temperature



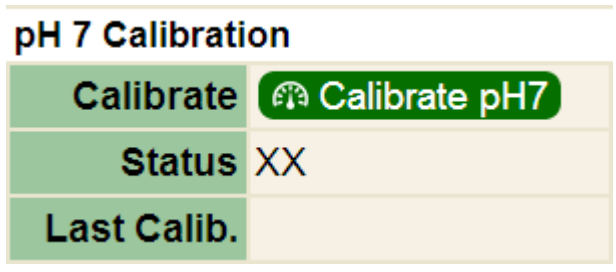
Field	Description
Nutrient Temp.	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

pH



Field	Description
pH	Current pH value being reported by sensor.

Buffer 1 pH 7



Field	Description
Calibrate	Pressing this button will start a pH7 calibration.
Status	Displays calibration information about the sensor.
Last Calib	Displays the last calibration date for the sensor.

Buffer 2 (pH4)

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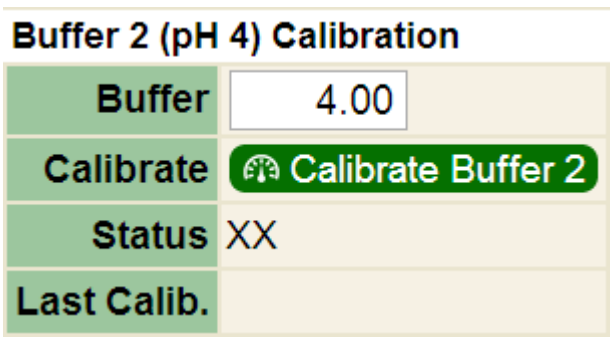
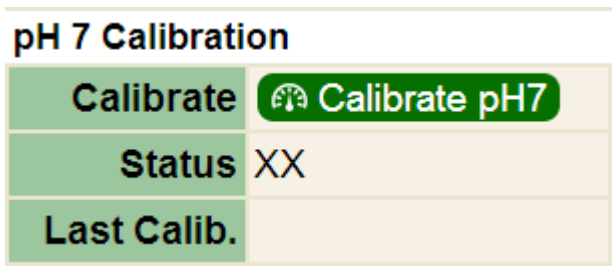


Field	Description
Buffer	pH value of the second buffer used in the pH calibration, this is usually a pH buffer of 4 but can be any other different pH level solution.
Calibrate	Pressing this button will start the second buffer calibration.
Status	Displays calibration information about the sensor.
Last Calib	Display the last calibration date for the sensor.

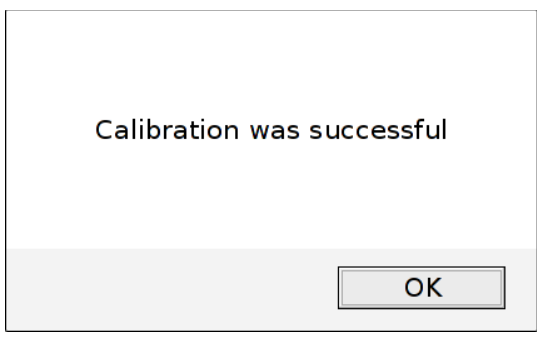
pH Calibration Procedure

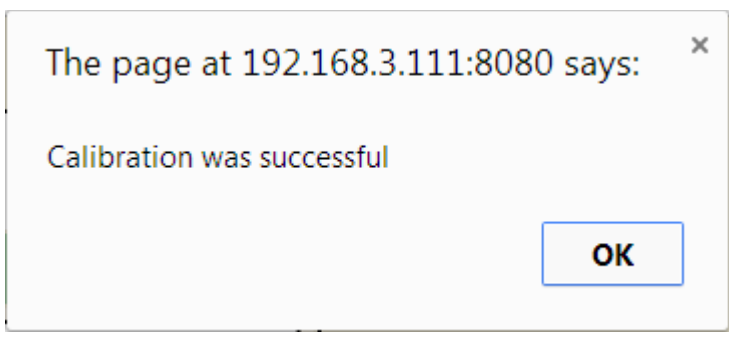
For each Remote EpM sensor within a group that is to be used for pH measurement it is recommended to calibrate the probes once a week to compensate for aging electrodes.

- Rinse the pH Electrode in fresh water.
- Place the probe into the pH 7 calibration solution.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate.
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

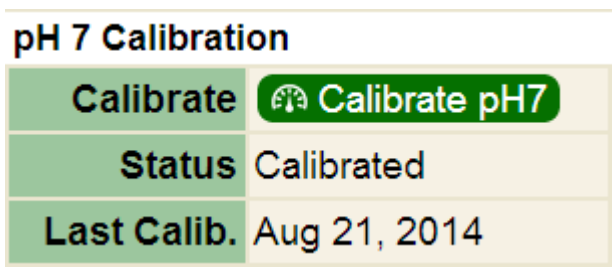


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).





- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- Press the activate button before moving on to the second point calibration (pH 4).
- After a successful calibration the Calib message and time will be updated.



- Rinse the pH Electrode in fresh water.
- Place the probe into the second (pH 4) calibration solution.

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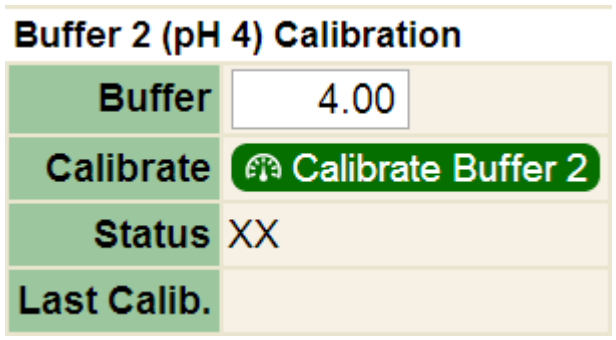
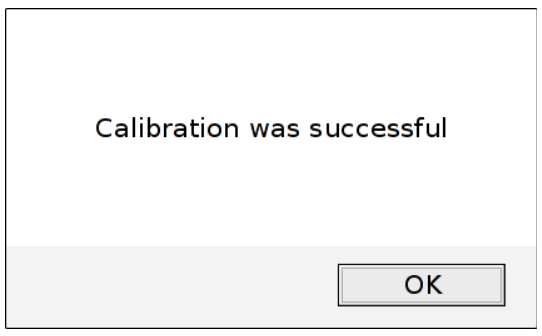
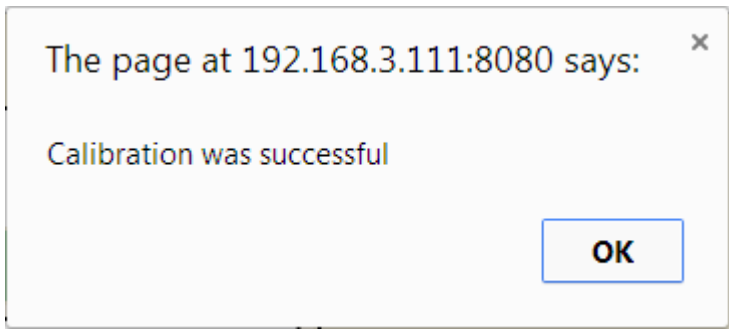
- Set the buffer value to match the buffer solution being used. Make sure to save and activate this if it has been changed.

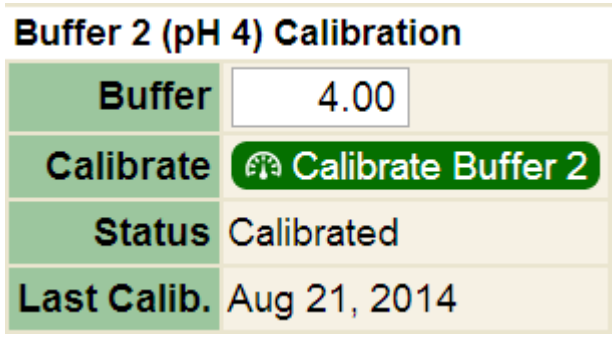


- Press the calibrate button, make sure the probe has been in the buffer solution for an adequate amount of time to allow the pH to stabilize (Recommended 5 Minutes).



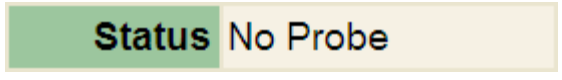


- Press the OK button on the pop up box to return to the previous page. The pop up window will vary based on if the calibration is begin done one the controller or remotely from another computer.
- The calibration must be activated before it is applied to the system.
- After a successful calibration the Calib message and time will be updated.

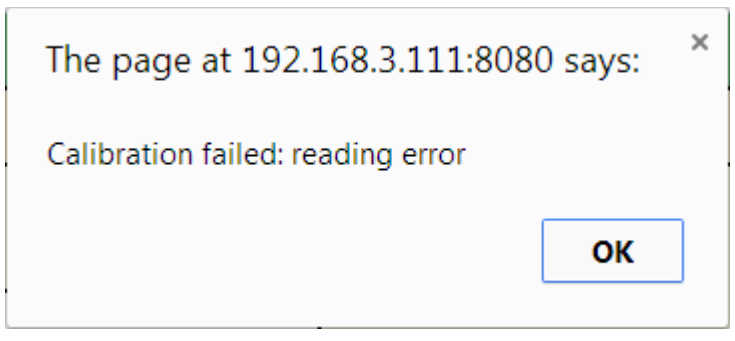


Calibration Errors

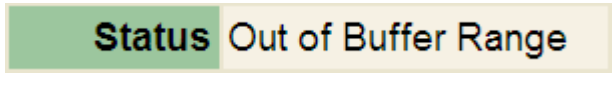
- **No Probe**



No Probe - If a calibration is to be done a valid reading from the sensor must be present on the system. If the following error message appears the is either no communication from the sensor or the probe maybe disconnected. Please insure that the power to the device is on and the probes are correctly connected. Also check the address switch and configured address for the desired sensor.



- **Out of Range**



Out of Buffer Range - If the currently enter buffer reading and the actual raw reading from the sensor differ by too much it is not possible to calibrate the sensors. An error like this usually indicated that either the probe is faulty or the buffer value has been incorrectly set. The error message displayed will specify where the Raw reading is too high or low. If this error occurs check the entered value for the buffer, also re-clean the probes and place back in the solution for at least 5 minutes to allow the reading to stabilize.

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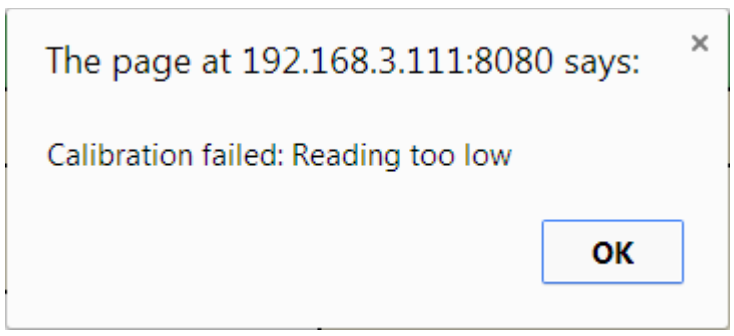
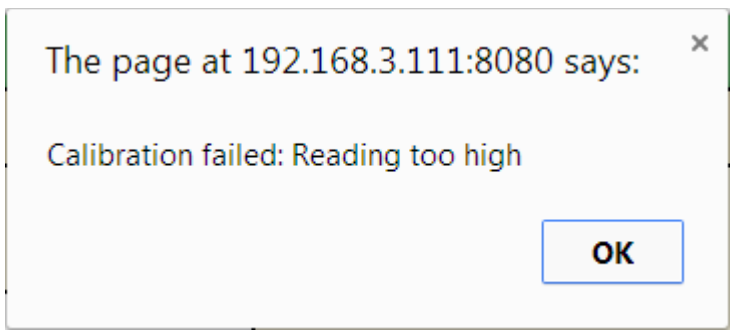
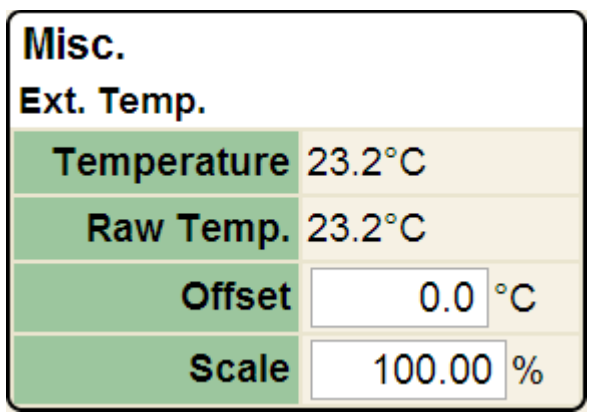




Misc.

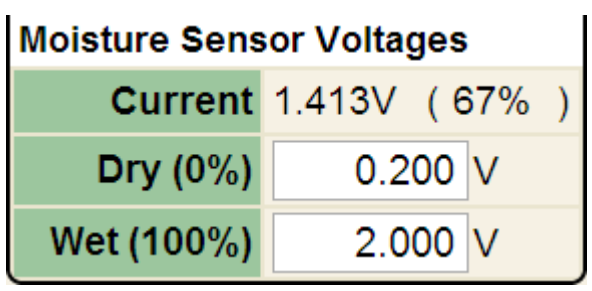
External Temperature



Field	Description
Temperature	Current nutrient temperature with the scale and offset applied, note if the scale is 100% and the offset is 0 this will match the raw reading.
Raw Temp.	Raw reading being report by the sensor.
Offset	An offset can be applied to the reading in order to calibrate it to another sensor device.
Scale	A scale factor can also be applied to the reading to calibrate it to another sensor, note that a scale factor of 100% is the same as appling no scale to the reading.

Moisture

The moisture probe options box will only appear if the input 1 type has been selected under the configuration page.

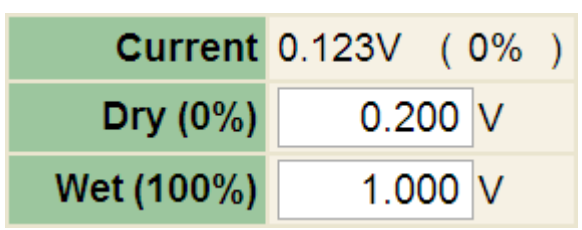


Field	Description
Current	Current voltage being measured by sensors from the moisture probe.
Dry (0%)	Voltage when probe is completely dry.
Wet (100%)	Voltage when probe is completely wet.

Moisture Probe Calibration Procedure

For each Remote EpM sensor within a group that is to be used for moisutre measurement it is recommended to calibrate the probes before using them, this usually only needs to be done once for a probe.

- First make sure the probe is completely dry.
- Navigate to the settings Irrigation -> Sensors page and click on the expand button for the sensor you are wishing to calibrate. And navigate to the Moisture Sensor Voltages box, note this will only be visible if the Input 1 type has been set to Moisture on the configuration page.



- Set the Dry setting value to match the current voltage being read from the sensor.

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Current	0.123V (0%)
Dry (0%)	0.123 V
Wet (100%)	1.000 V

- Place the probe in to a glass of water, this is to ensure 100% wet of the probe for accurate calibration.
- Set the Wet setting value to match the current voltage being read from the sensor.

Current	1.393V (100%)
Dry (0%)	0.123 V
Wet (100%)	1.393 V

- Once these two settings have been enter, save and activate the settings to complete the calibration.
- Once completed the probe can be placed into desired media for normal operation.

Current	0.564V (35%)
Dry (0%)	0.123 V
Wet (100%)	1.393 V

Use Factory Defaults

Use Factory Defaults

Reset	Reset Now
Clear CC 1 Count	Clear Now
Clear CC 2 Count	Clear Now

Field	Description
Reset	Pressing this button will reset all calibration constants for Nutrient and pH. This button will not effect the offset and scale settings.
Clear CC 1 Count	Manually reset the contact closure count of Input 1 back to zero.
Clear CC 2 Count	Manually reset the contact closure count of Input 2 back to zero.

Averages

Averages

Tick Box to Add Reading to Average

Nutrient	2.71mS/cm^2	☑
Nutrient Temp.	26.8°C	☑
pH	6.63	☑
Ext. Temp.	21.6°C	☑
Moisture	67%	☑

This box lists all values that are supplied by a Remote EpM senosrs that can be averaged together. This will display variables even if they are not selected as an input on the configuration page.

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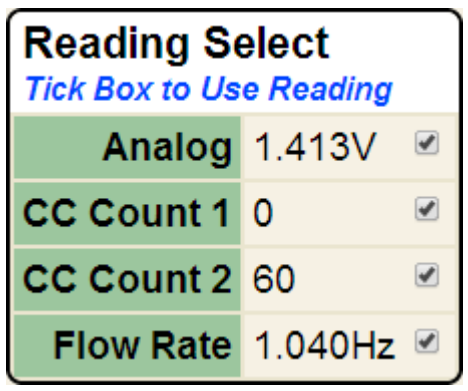
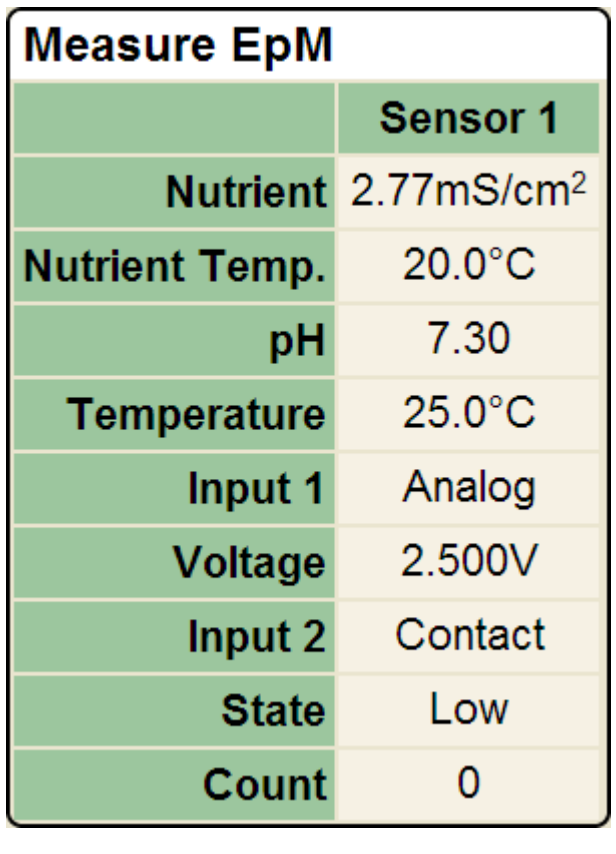
Reading Select



This box lists all values that are supplied by a Remote EpM senosrs that can be select to be used as the main reading out of the set. This will display variables even if they are not selected as an input on the configuration page.

Readings

EpM Sensor's



The above field displays the readings for every sensor within the Measure EpM group. All the readings from each sensor and each group are the same as pictured above, this includes the Check and Source EpM groups.

Field	Description
Nutrient	The current nutrient reading from the sensor if this is every 0.00mS/cm&sub2 check the probe. A reading this low should not be possible if the probe is in water. A reading of this suggest the probe is no longer submerged in water.
Nutrient Temp.	Current temperature of the water the probe is submerged in. Note due to the nature of the material the probe is made from the thermal conductance of the probe is rather low, this means a change in temperature of the water may take a while to effect the actual temperature displayed here.
pH	Current pH level of the water.
Temperature	The temperature of the Stainless steel External temperature probe wired into the sensor this will appear as XX if not connected or an error has occurred.
Input 1	What the current input wired into the Analog input pin of the sensor is, this will only effect what is displayed in the box below.
Voltage / Moisture / Count	Depending on how Input 1 is configure the variable here will be listed accordingly. *Voltage* Current voltage on the input pin. *Moisture* Current moisture in percentage based on the sensor settings. *Count* Current count of the input pin.
Input 2	What the current input wired into the CC input pin of the sensor is, this will only effect what is displayed in the box below.
Count / Flow	Depending on how Input 2 is configure the variable here will be listed accordingly. *Count* Current count of the input pin. *Flow* Current calculated flow rate based on the frequency being supplied by the input.

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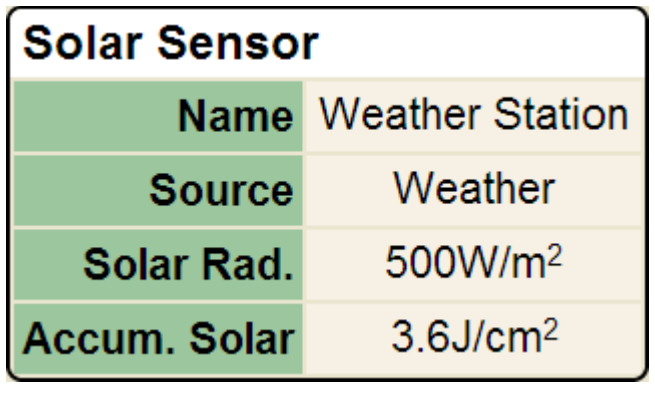
Solar Sensor

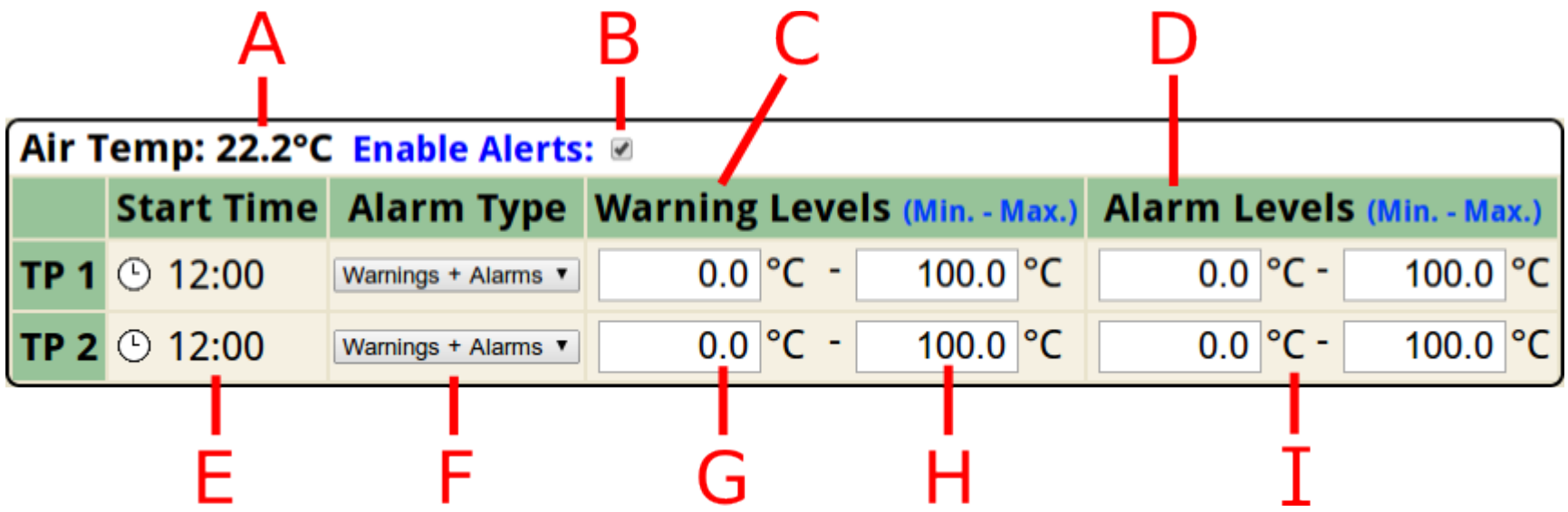


Field	Description
Name	Name given to the solar sensor this will vary depending on the source
Source	Current solar source configured on the system on the Configuration -> Sensors page.
Solar Rad.	Current solar radiation reading being measured from the sensor. If this is XX check the sensor is correctly configured.
Accum. Solar	Accumulated solar for the system based on the configured solar source, this is reset at the systems end of day.

Alarms

For Irrigation you can set limits for Nutrient and pH levels per Irrigation System.

You can set alert limits for various readings in the system for both Alarms and Warnings under the Settings section by clicking on the Alerts tab.



Annotation	Name	Description
A	**Current Reading**	The current reading for the reading you wish to set an alert limit for
B	**Enable Checkbox**	If ticked, enables alerts for this reading
C	**Warning Levels**	This column shows limits that will raise Warning alerts
D	**Alarm Levels**	This column shows limits that will raise Alarm alerts
E	**Time Period**	The time period for which the limits are valid for
F	**Alert Type**	Per time period alert types, allows you to disable Warnings or Alarms or all alerts for the rows time period
G	**Min Limit**	The minimum value for a reading before an alert is raised
H	**Max Limit**	The maximum value for a reading before an alert is raised
I	**Unit**	The unit that the limit is measured in

Dosing Alarms

Since a continuous system doses one tank with a single program with a single nutrient and pH target, the alarms available for this system are Nutrient and pH level alarms set per time period.

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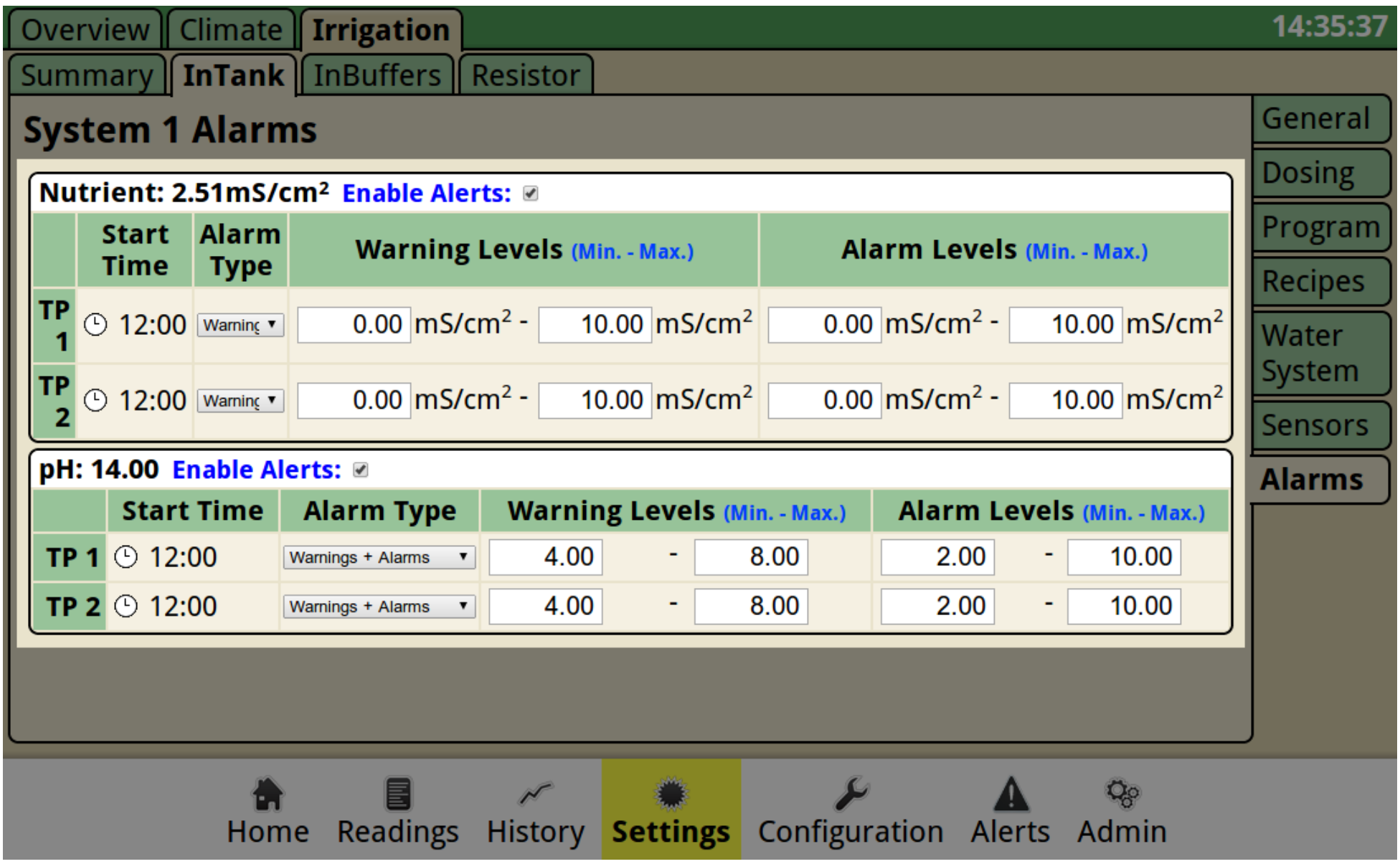
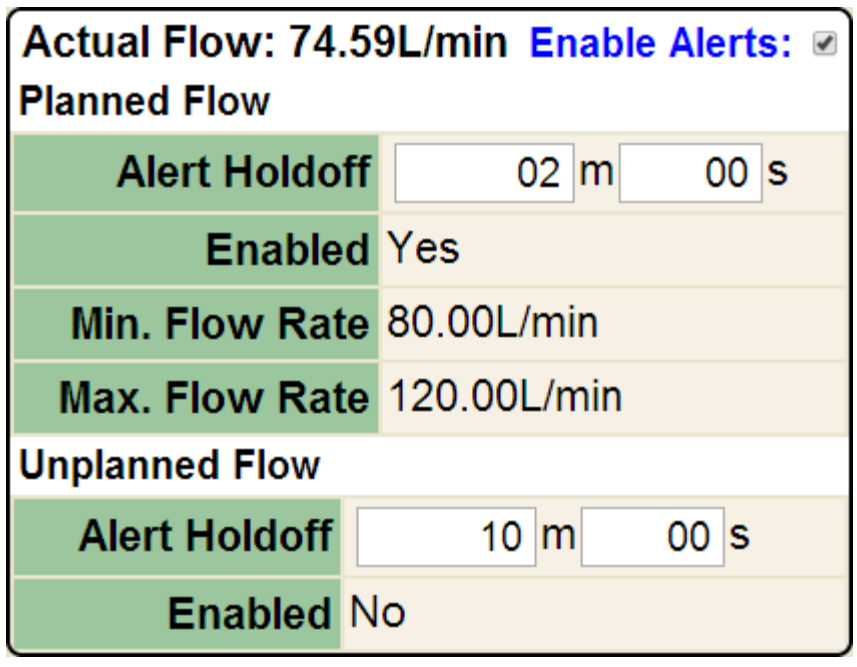


Flow Rate Alarms

If a flow meter is installed on a system the flow rate alarms can be configured under the water system tab. Here the currently active flow alarms will be displayed. An irrigation system has two flow rate alarms that become active under different conditions (Planned and Unplanned), it is no possible for both of these alarms to be active at the same time.

Planned



If the system has been set up for planned flow alarms these will be displayed here whenever flow is predicted on the system. The minimum and maximum flow calculated for the system are displayed here. If the flow goes outside of these bounds for the holdoff time an alarm will be generated. There are no warning for flow alarms they are always treated as alarm level events, depending on how the flow alarms have been configured it is possible that this alarm will stop the dosing or the whole irrigation system.

Unplanned

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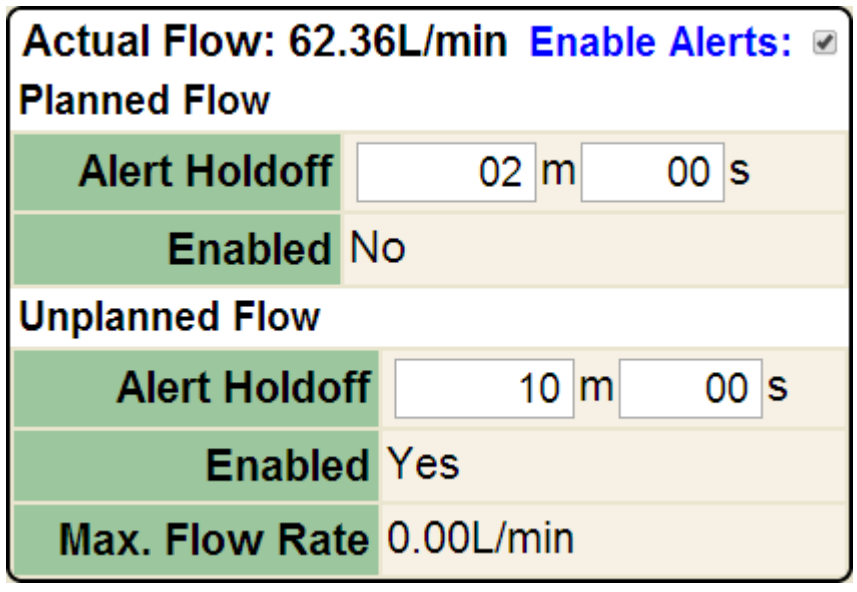


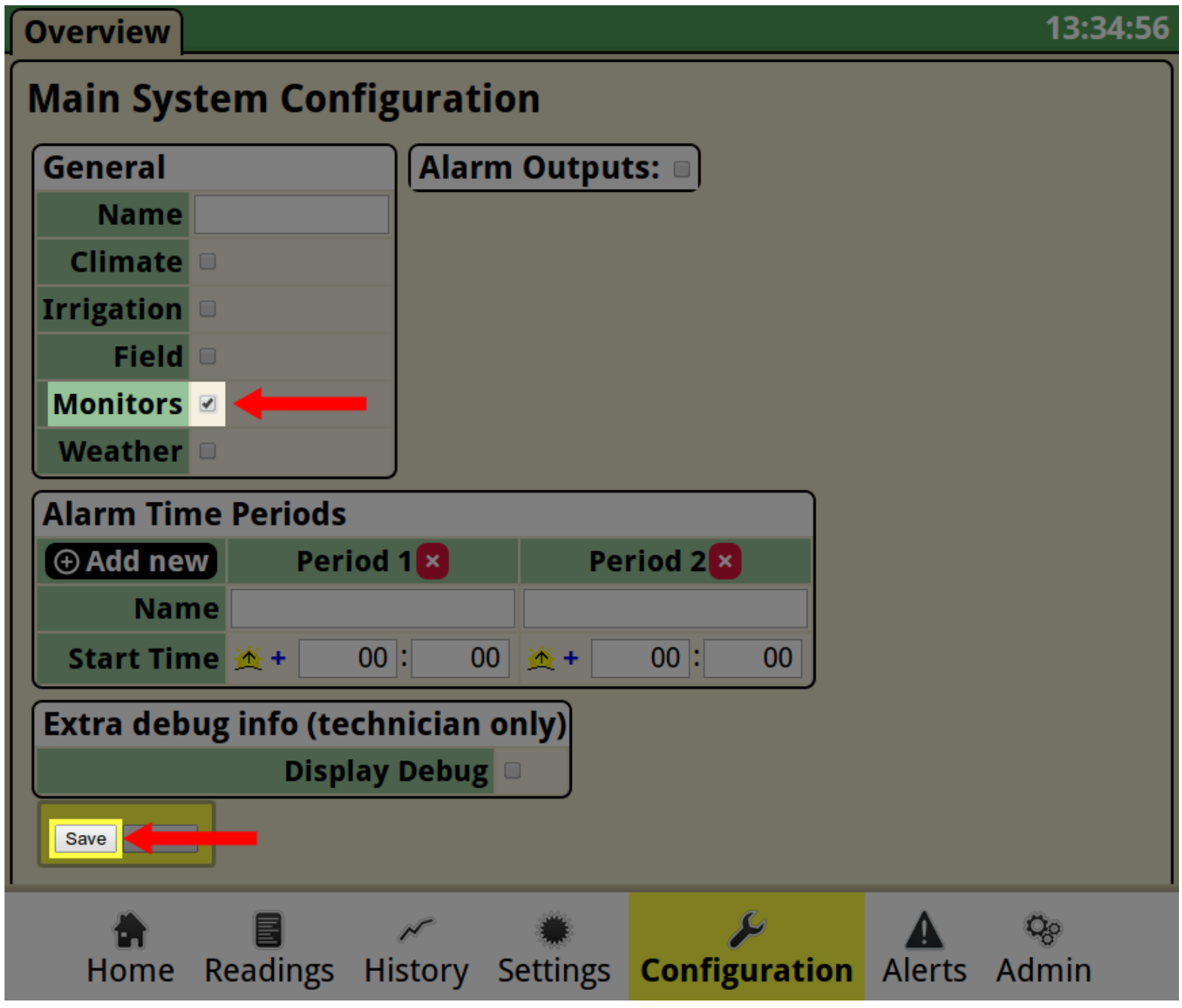
If the system has been set up for unplanned flow alarm it will be displayed here whenever no flow is predicted on the system. The maximum flow is a set level defined under the water system per time period and if the flow goes above this level for the holdoff time an alarm will be generated. There are no warning for flow alarms they are always treated as alarm level events.

Monitors

The Multigrow controller can have independent monitors attached to blah blah blah.

Configuration

To configure monitors, go to the **Configuration** section and ensure that the **Monitors** checkbox is ticked. If not, tick it, press the **Save** button that appears at the bottom of the page.



You won't need to push the **Activate** button on the configuration bar until you have finished configuring the monitor.

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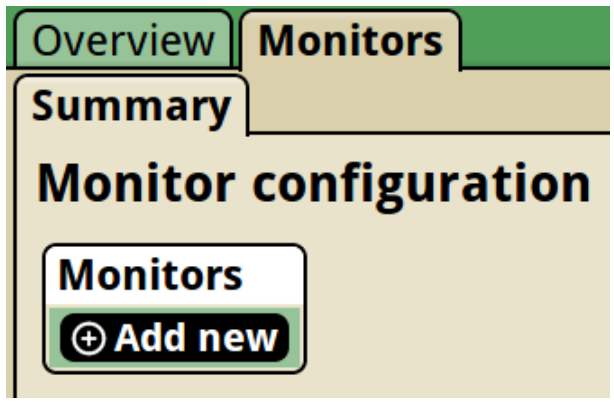
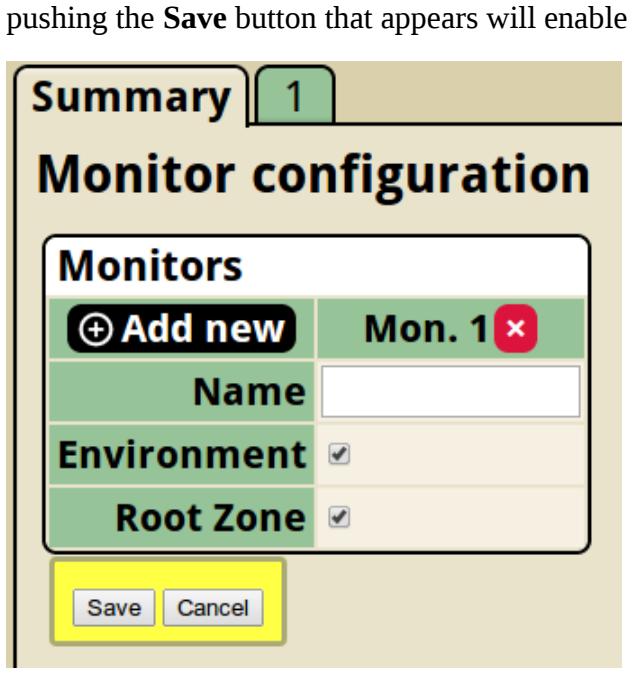
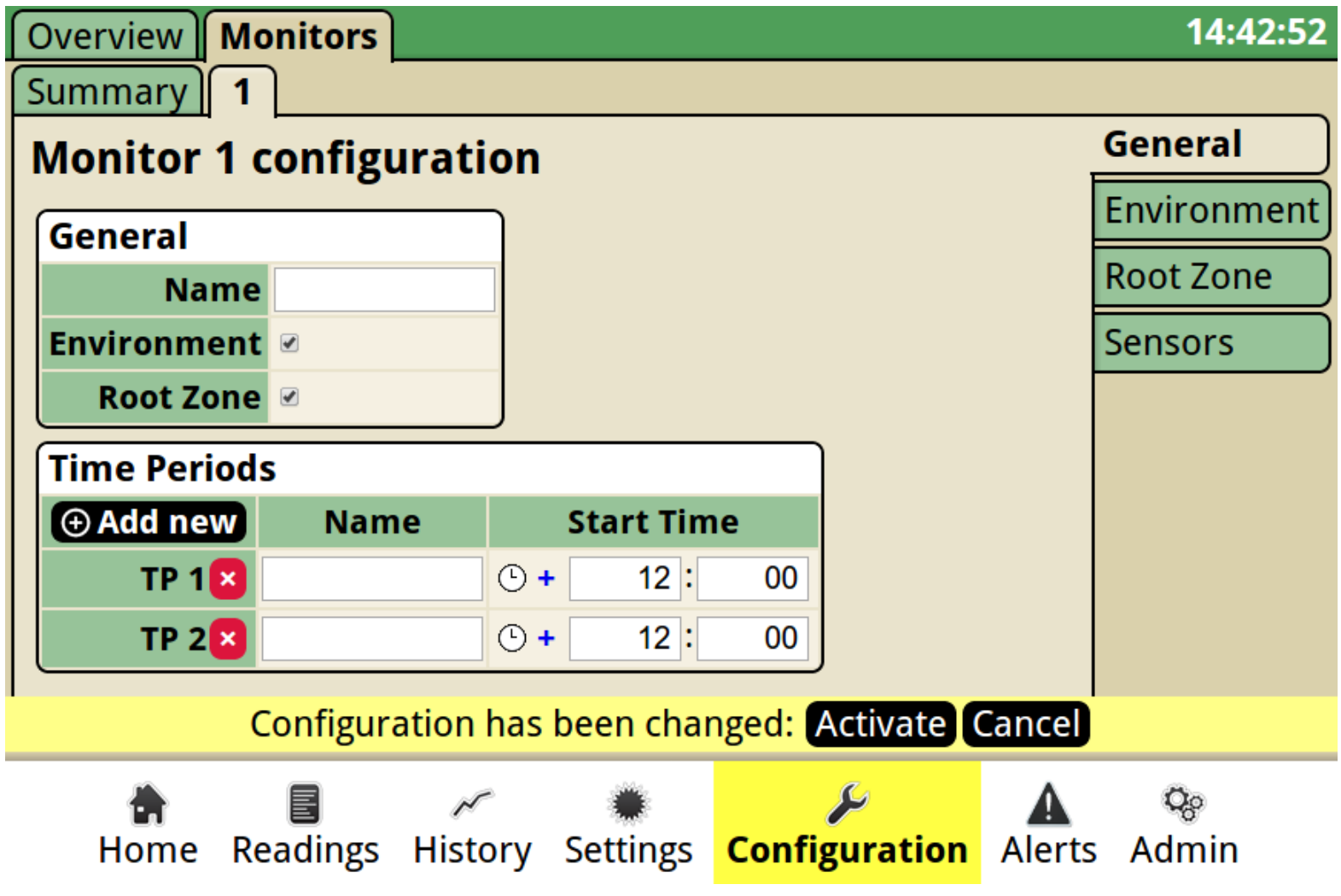
You should now have a new tab appear in the at the top of the page in the Primary Menu called **Monitors**. Pressing on this tab will allow you add and configure individual monitoring systems.



Push the **Add new** button to add a new monitoring system. You will notice that the Secondary Menu has a new tab added to it. The name of this tab will change from the default of "1" when you give the Monitor a name. Putting a tick in the checkboxes beside **Environment** and **Root Zone** and pushing the **Save** button that appears will enable monitoring of those features.



Pressing the tab for the first monitor "1" will take you to the configuration section for the first monitor, which shows as the **General** tab. This shows the basic settings for this monitoring system, which mimic that shown on the monitors **Summary** tab. It also contains the time period configuration for this monitoring system.



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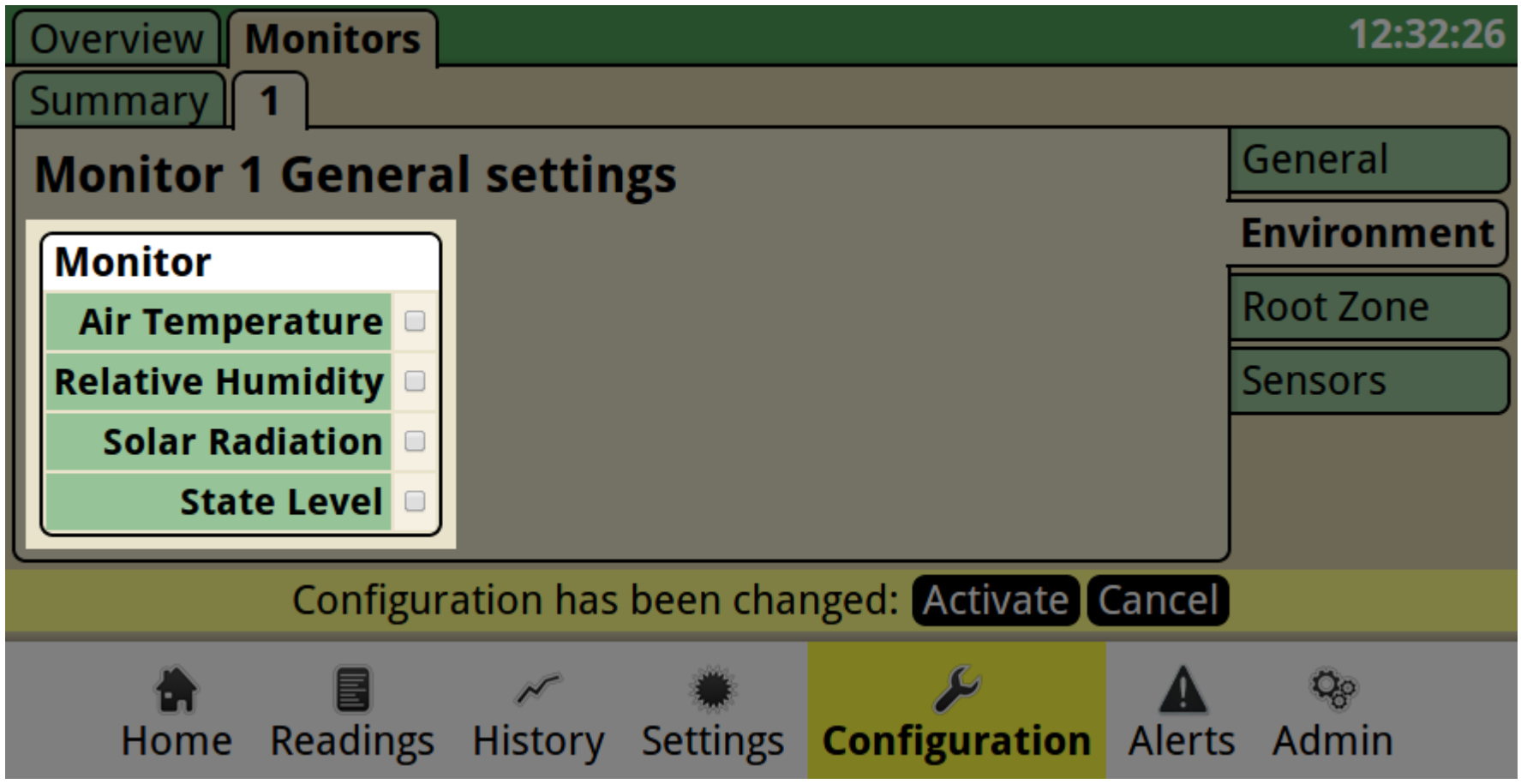
Environment

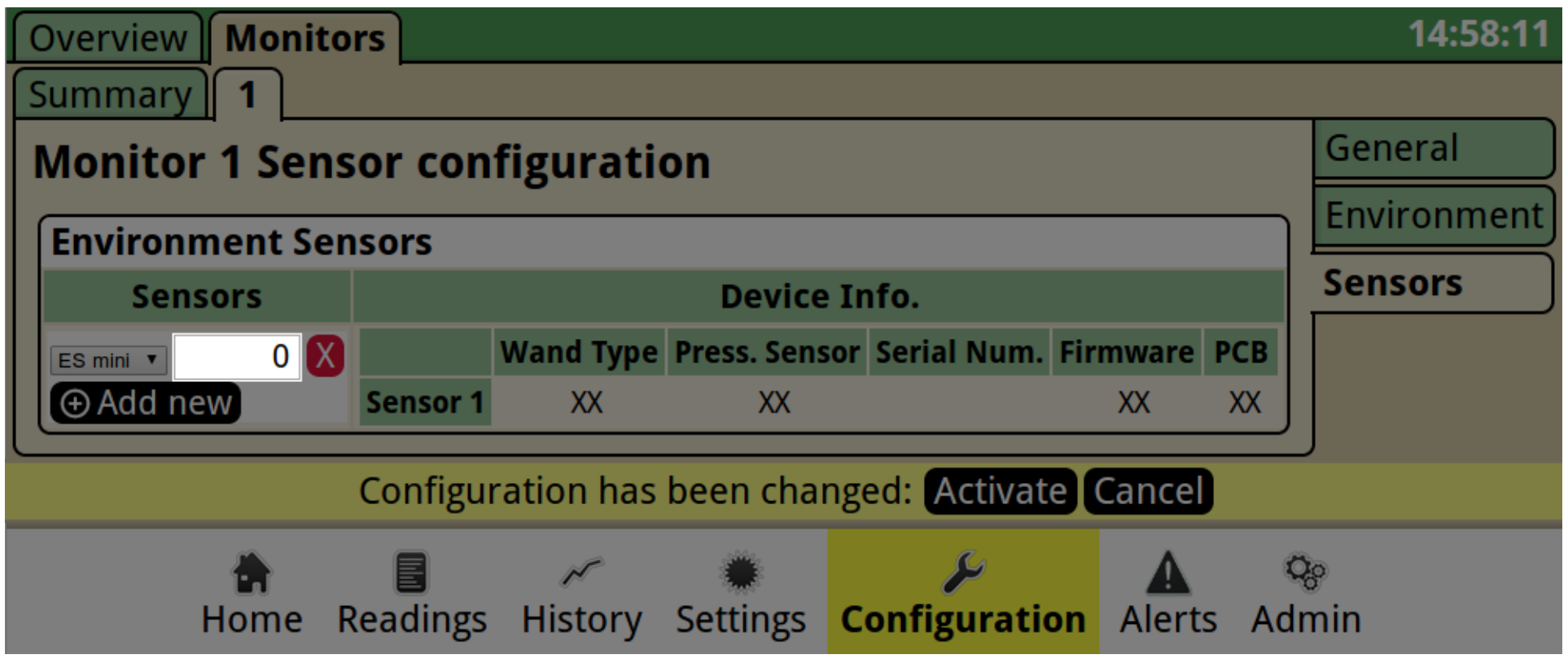
When the **Environment** checkbox is ticked (and the **Save** button pushed), the **Environment** tab will appear in the Tertiary Menu on the left.

Pushing the **Environment** tab to the right in the Tertiary Menu will take you to the configuration page for environment monitoring:

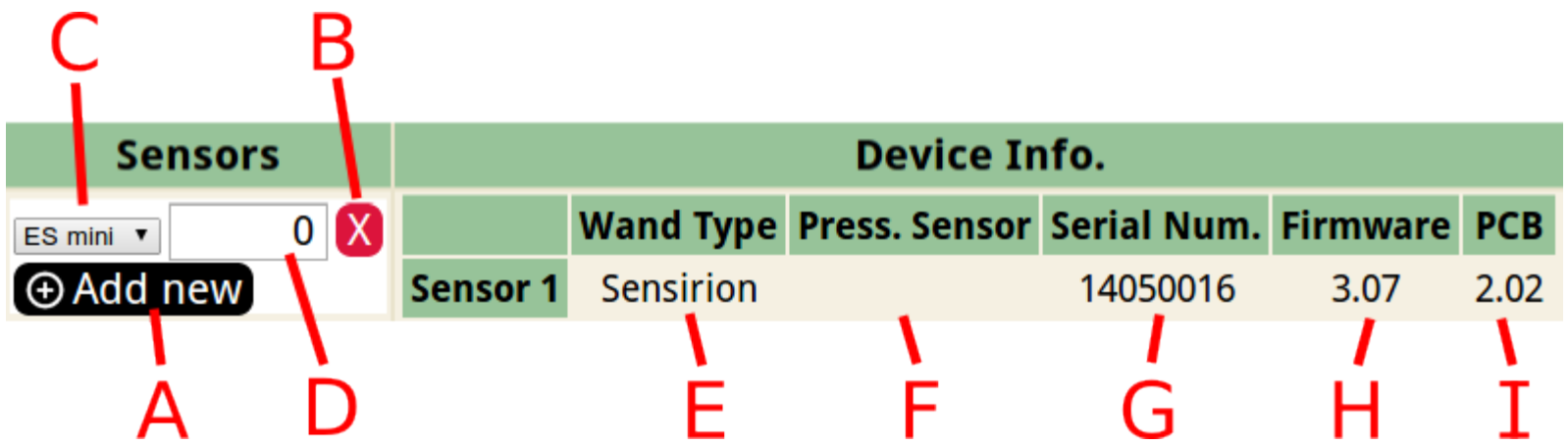


Select the type of readings you want to monitor and press the **Save** button that appears.

You will now need to configure the sensor that the monitor will use. Click on the **Sensors** tab to the right in the Tertiary Menu and enter the address of your sensor in the box provided (in this case the address is "*0*").



A description of the environment sensor configuraiton is provided below:



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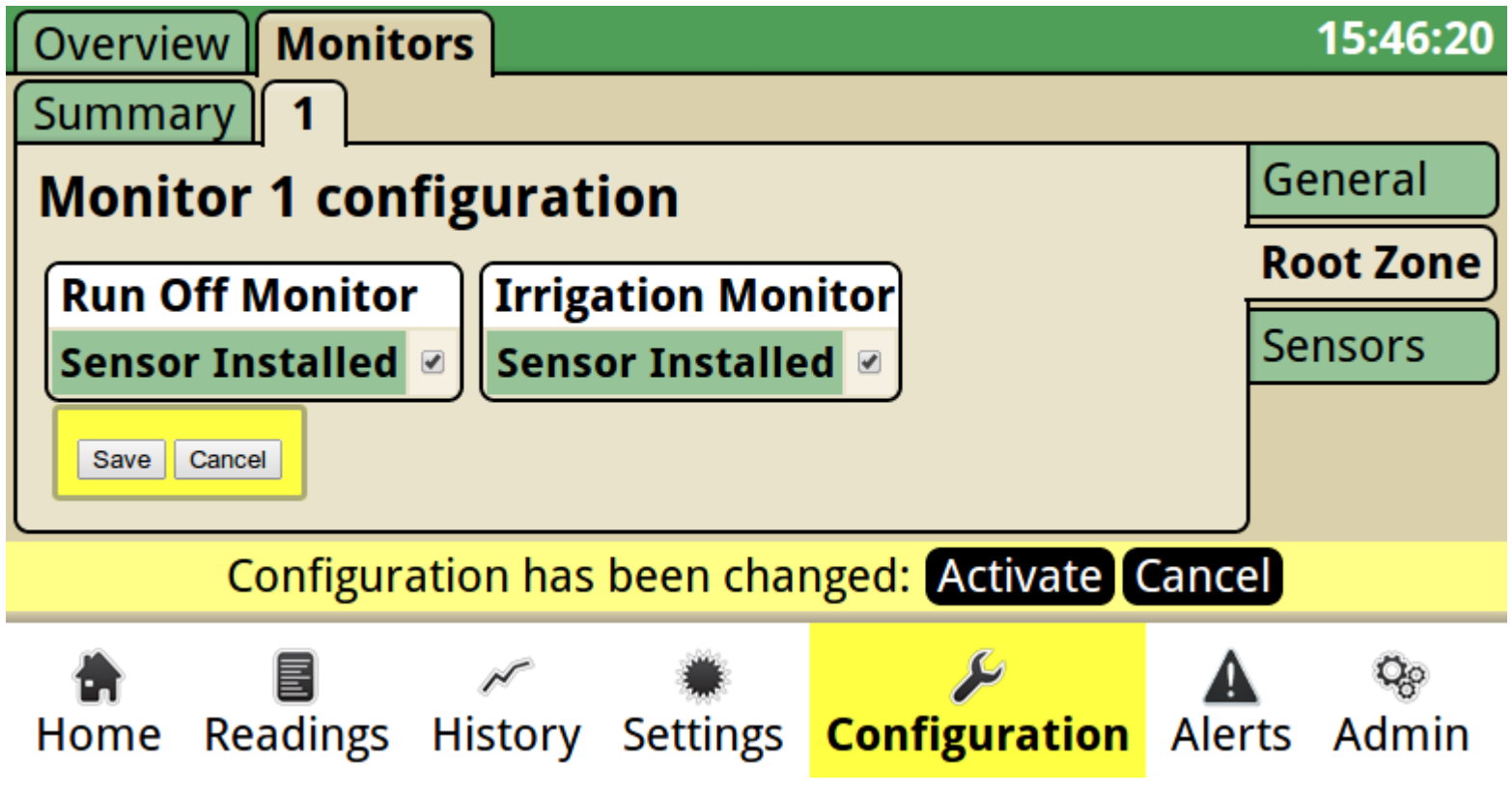
Annotation	Name	Description
A	**Add new button**	Adds an EPM sensor
B	**Delete button**	Deletes an EPM sensor
C	**Sensor Type**	The type of sensor installed (unless you know you have an ES Maxi set this to ES Mini)
D	**Sensor address**	The address of the sensor. Each box must be populated with the corresponding address of the EpM device
E	**Wand type**	Type of temperature/humidity sensor fitted to the device
F	**Pressure Sensor**	Type of pressure sensor installed (only visible with ES Maxi devices)
G	**Serial**	Serial number of the device connected under that address
H	**Firmware**	Current version of the firmware this device is running
I	**PCB**	PCB version of the device

Sensor information is only available once the configuration has been activated by pushing the **Activate** button

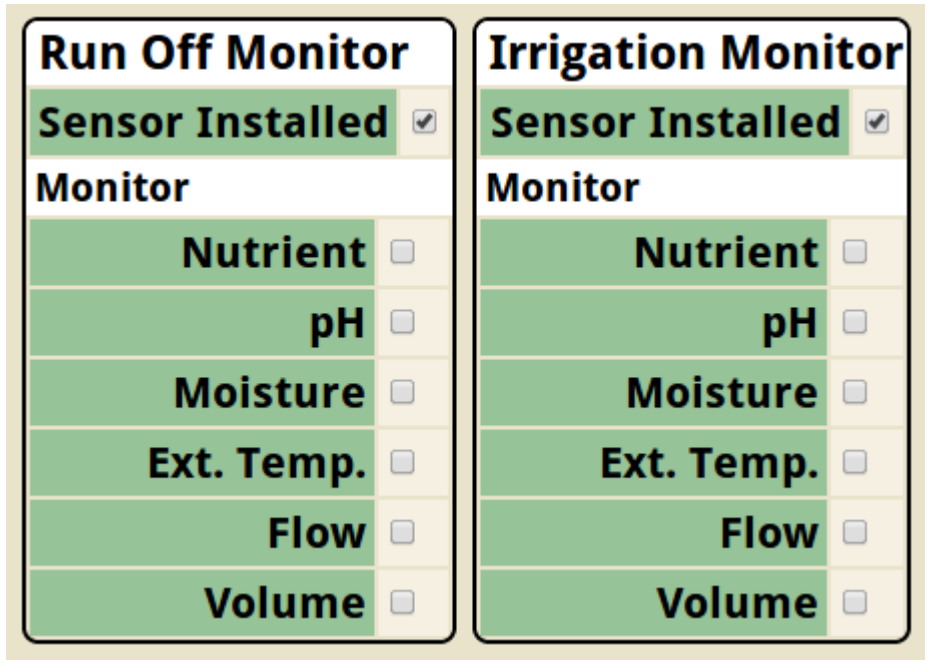
Once you press the **Activate** button the monitor will be enabled and you can move on to the settings part.

Root Zone

When the **Root Zone** checkbox on the general tab for the monitor configuration is ticked and the **Save** button pushed, the **Root Zone** tab will appear in the Tertiary Menu on the right. Pressing this tab will take you to the configuration for the Root Zone monitoring for that monitor.



Ticking both checkboxes labelled **Sensor Installed** as above will enable monitoring for both Run Off and Irrigation. Once you push the **Save** button more checkboxes will appear for the individual readings provided by the sensors:



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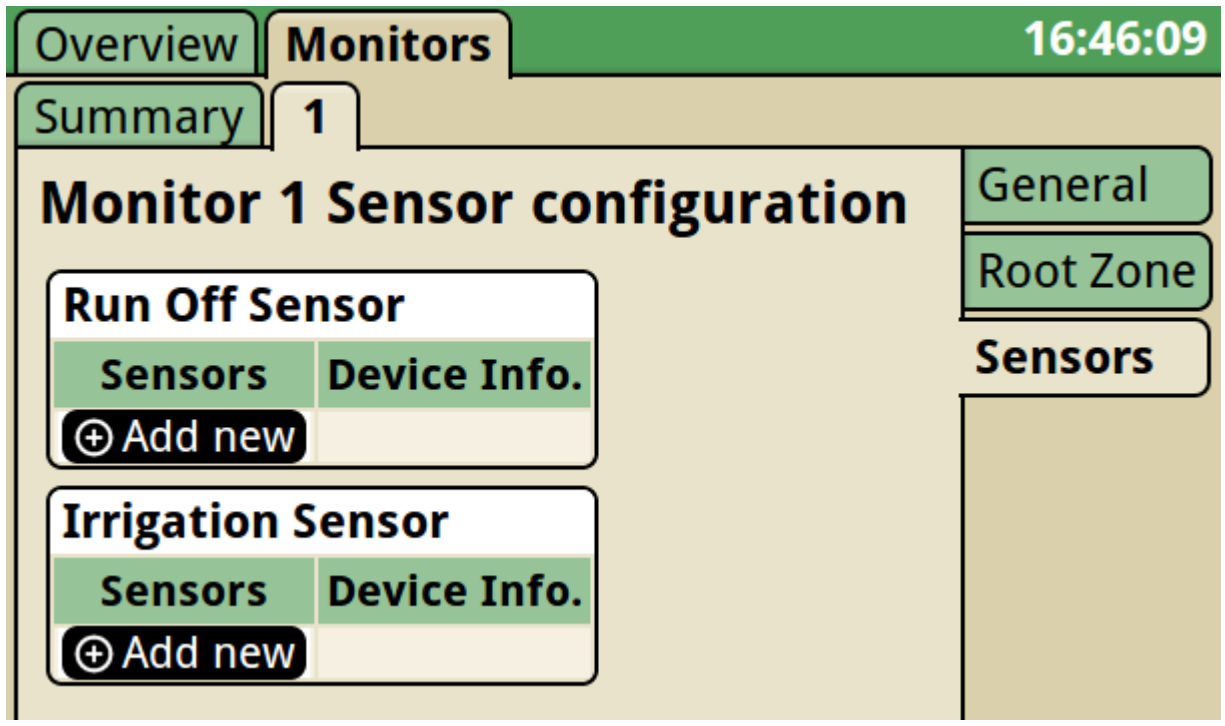
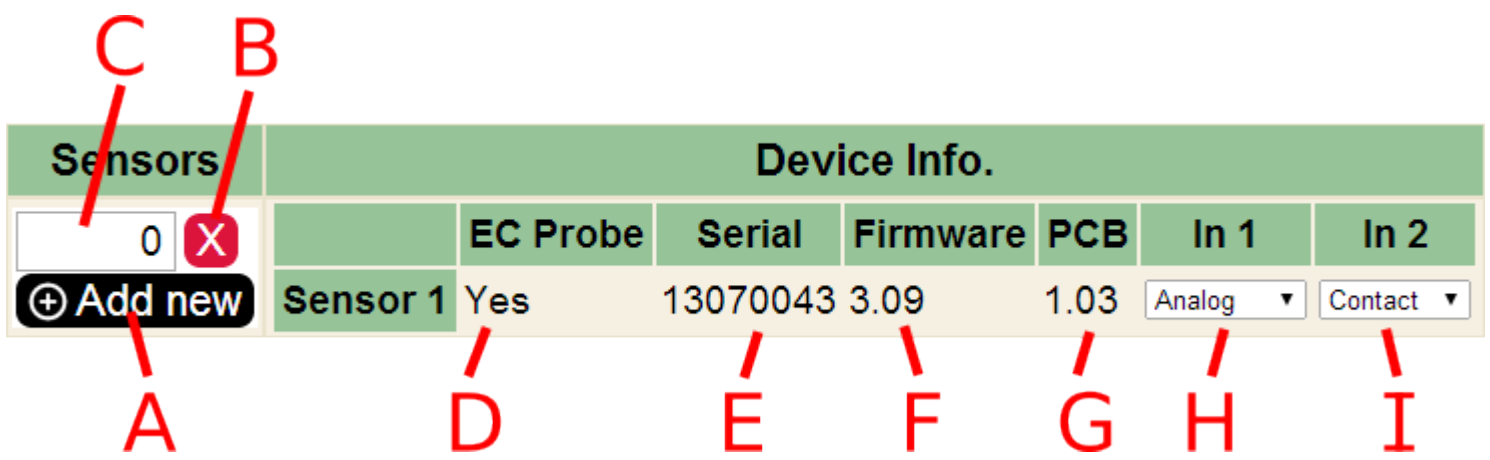
Choose the readings you wish to monitor and push the **Save** button again. Now you will need to configure the sensors. Run Off and Irrigation will both require their own sensors as can be seen when you press the **Sensors** tab from the Tertiary Menu on the right.



Press the **Add new** button to add a new sensor and then enter the address of the EPM sensor device. See below for a description of the sensor configuration.



Annotation	Name	Description
A	**Add new button**	Adds an EPM sensor
B	**Delete button**	Deletes an EPM sensor
C	**Sensor address**	The address of the sensor. Each box must be populated with the corresponding address of the EpM device
D	**EC Probe**	Does the Remote EpM currently have an EC Prove attached?
E	**Serial**	Serial number of the device connected under that address
F	**Firmware**	Current version of the firmware this device is running
G	**PCB**	PCB version of the device
H	**In1**	• **Contact:** Input 1 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to 5 - 10V when contact is made • **Analog:** Analog voltage is connected to input 1 of sensor • **Moisture:** Moisture probe is connected to Input 1 of sensor
I	**In2**	• **Contact:** Input 2 has a contact closure sensor connected to it. Due to the nature of this input pin in order for the contact closure to operate correctly the input should be pulled to ground when contact is made • **Flow:** Input 2 is a flow meter input, again this should be pulled to ground when contact is made for correct operation

Sensor information is only available once the configuration has been activated by pushing the **Activate** button

Settings

Monitors are slightly different in how the alerts are setup, and represent how we plan to setup all alarms in future. The main difference is that beside

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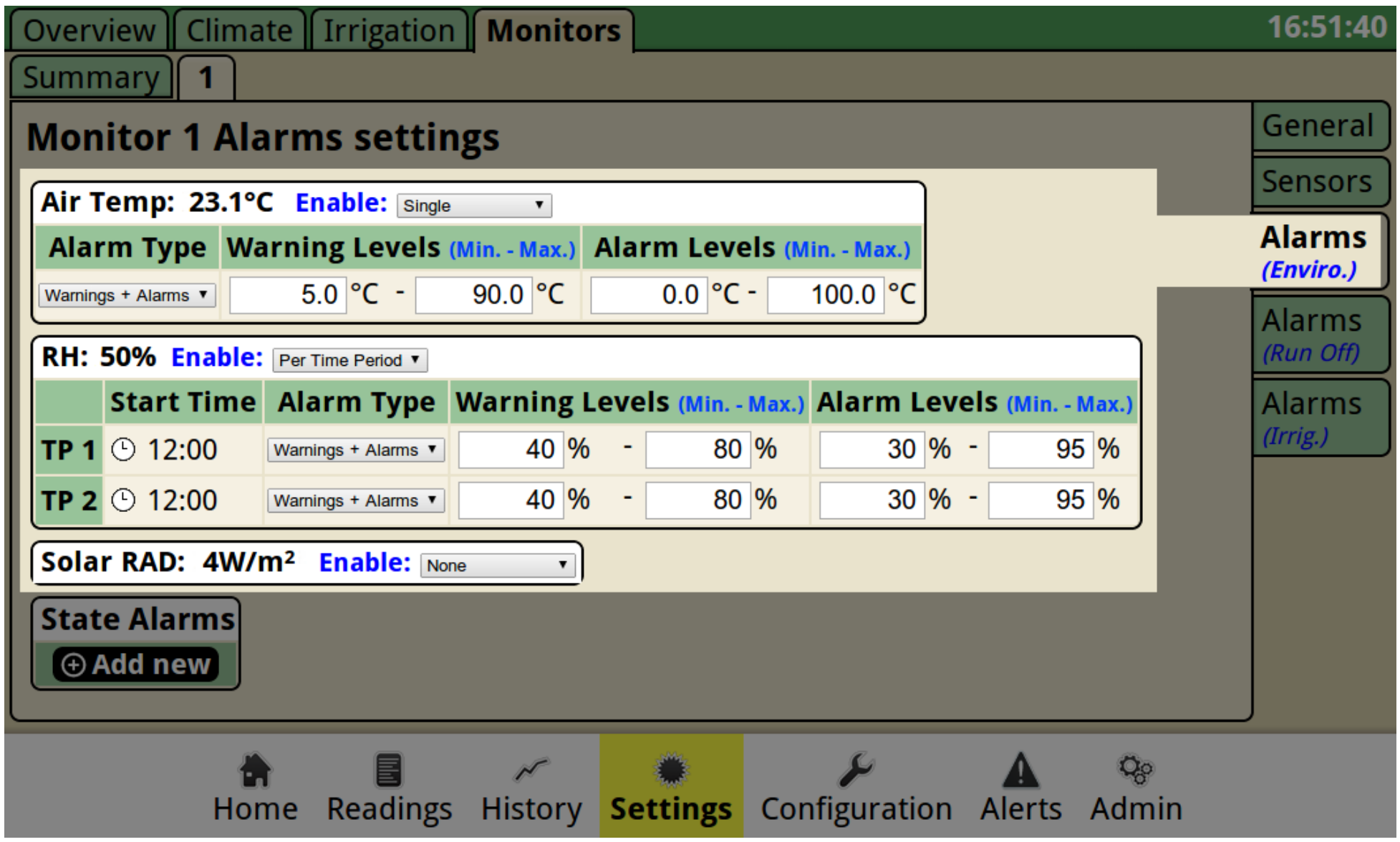
Enable, instead of a checkbox (annotation **B** in the diagram above), there is a dropdown list. This can be set to one of:

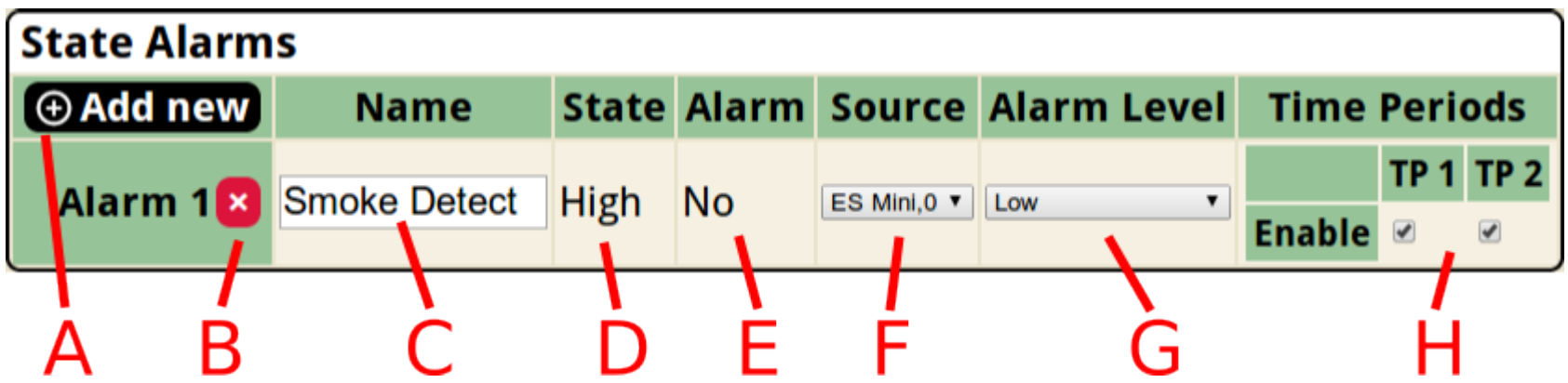
- "*None*" - disables alerting for this reading
- "*Single*" - a single set of alert limits for all time periods
- "*Per Time Period*" - a set of alert limits for each configured time period (as with the other alerts)

Environment



State Alarms

State alarms are alarm alerts generated by contacts closing on an attached device. These can be setup to monitor anything that can send an electronic signal to close the contacts on the device, like smoke and heat detectors for example.



Annotation	Name	Description
A	**Add button**	Adds another state alarm
B	**Delete button**	Deletes a state alarm
C	**Alarm name**	The name that will be displayed in the alert logs
D	**Current state**	The current state of the contact closure
E	**Current alarm state**	Yes if the alarm is currently active, No if not
F	**Source device**	The device whose contact closure you want to monitor
G	**Contact Closure level**	Which state to raise the alarm for (e.g. setting to high while the current state is high would raise an alert immediately)
H	**Time periods**	The time periods which you want this alarm to be enabled for

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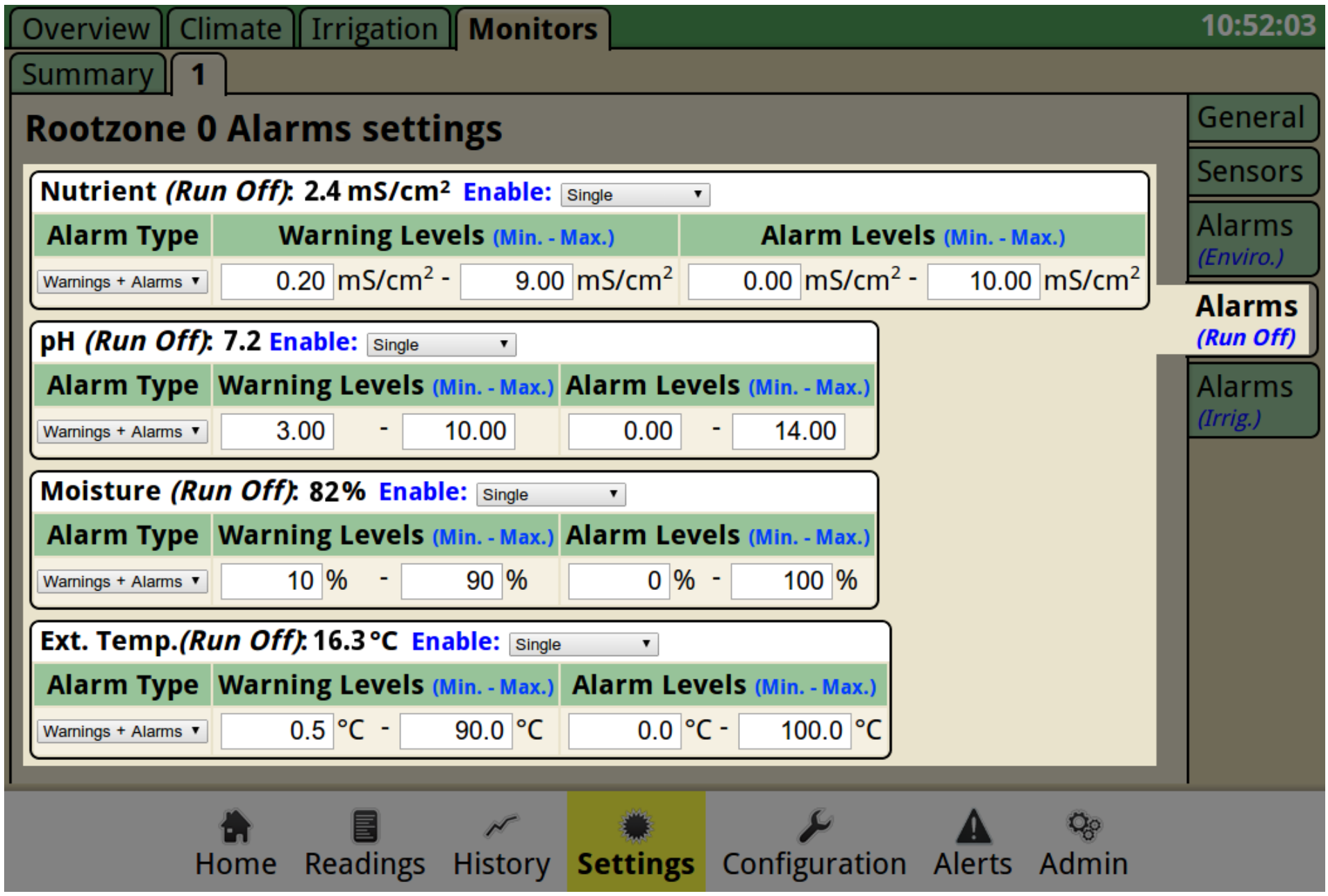
Run off

The Run Off tab is part of the rootzone monitoring and allows you to take measurements of the water after it has been through your crop. You can measure:

- Temperature
- Nutrient
- pH
- Moisture



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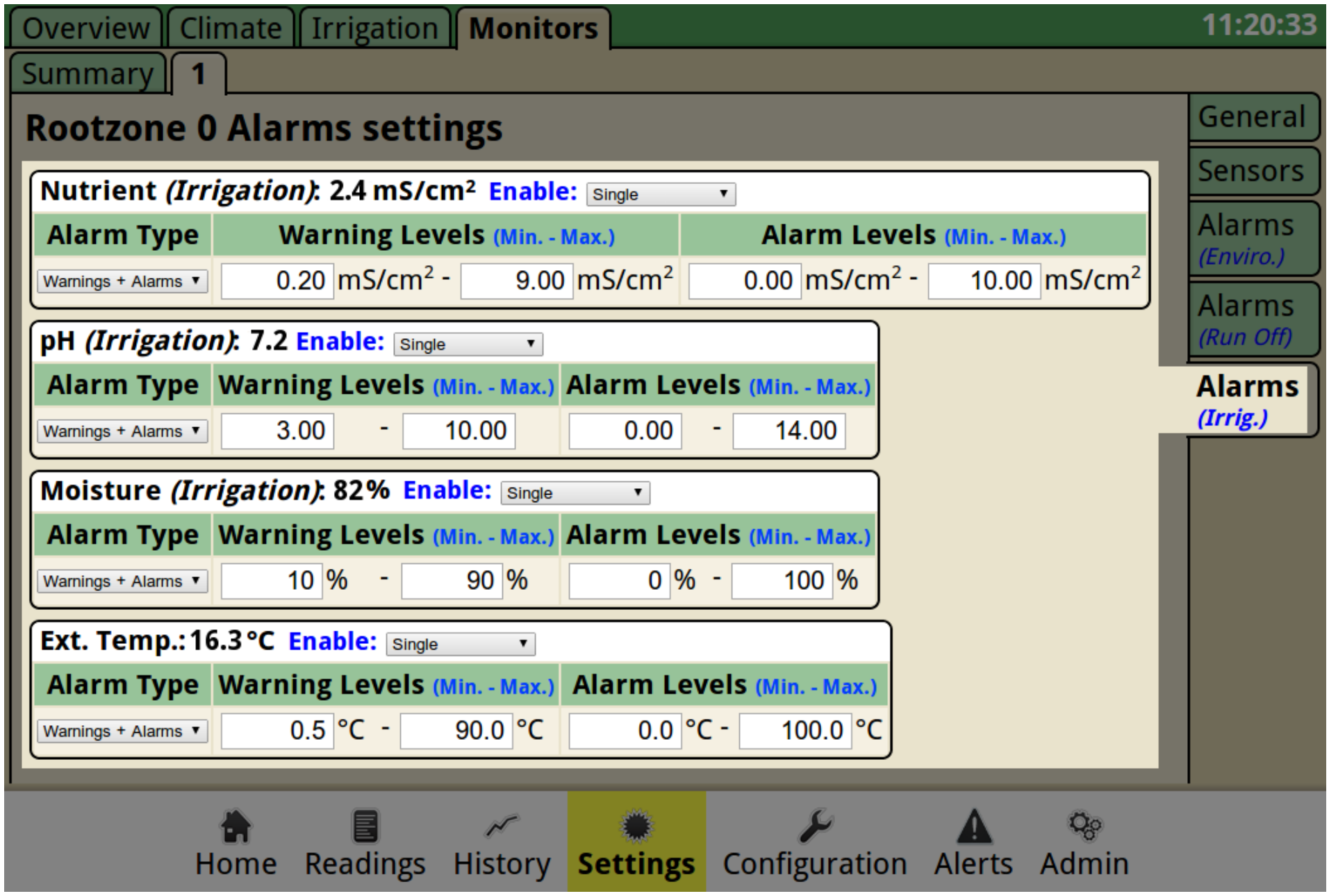
Irrigation

You can also setup independent monitors for an irrigation system:

- Temperature
- Nutrient
- pH
- Moisture



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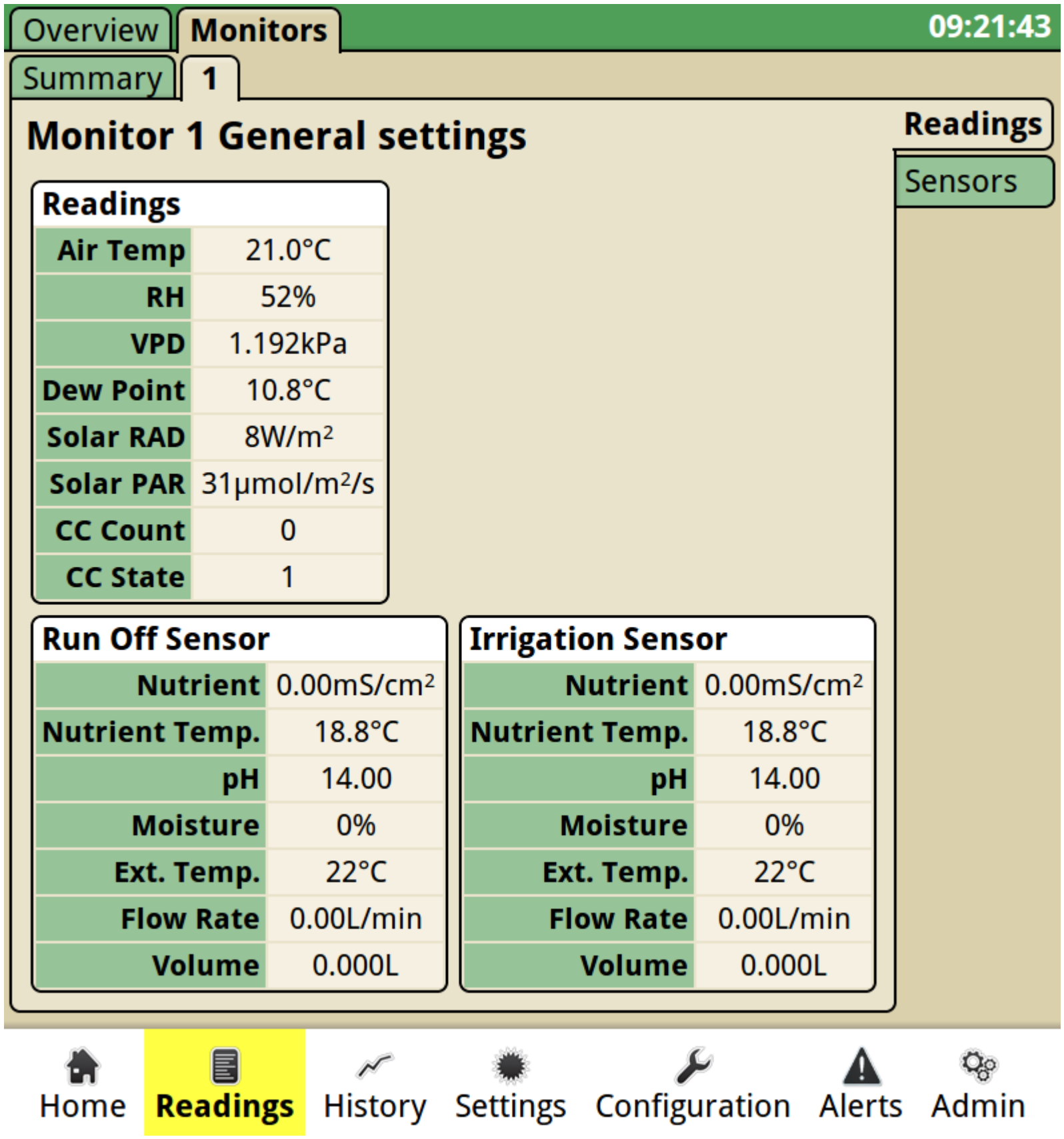
Readings

You can view the readings page for a monitor to see the current readings from the sensor as well as readings calculated by the Multigrow. The following shows the readings page with Run Off, Irrigation and Environment monitors configured.



There is also a sensors page which shows readings coming directly from the configured sensors.

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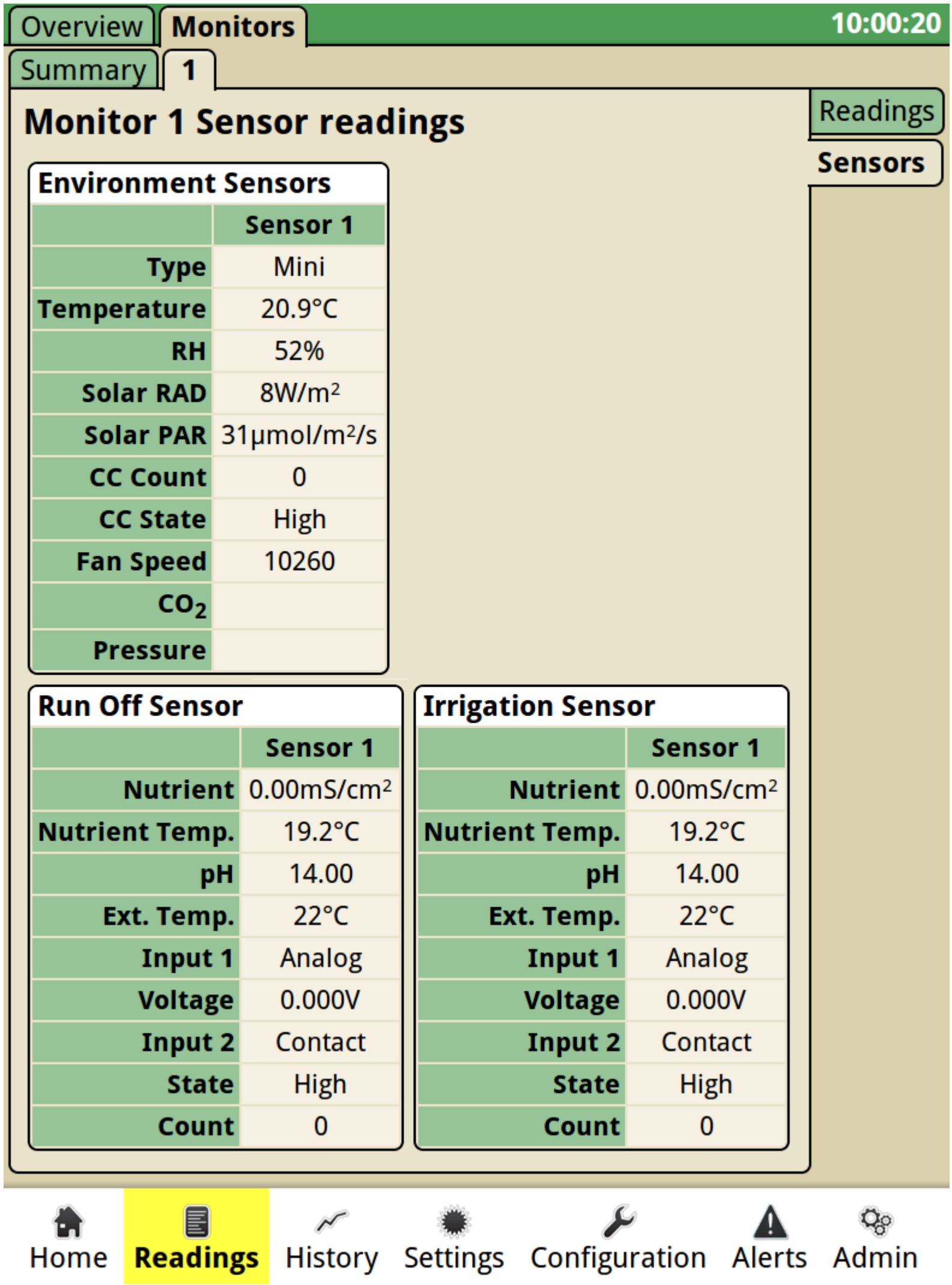

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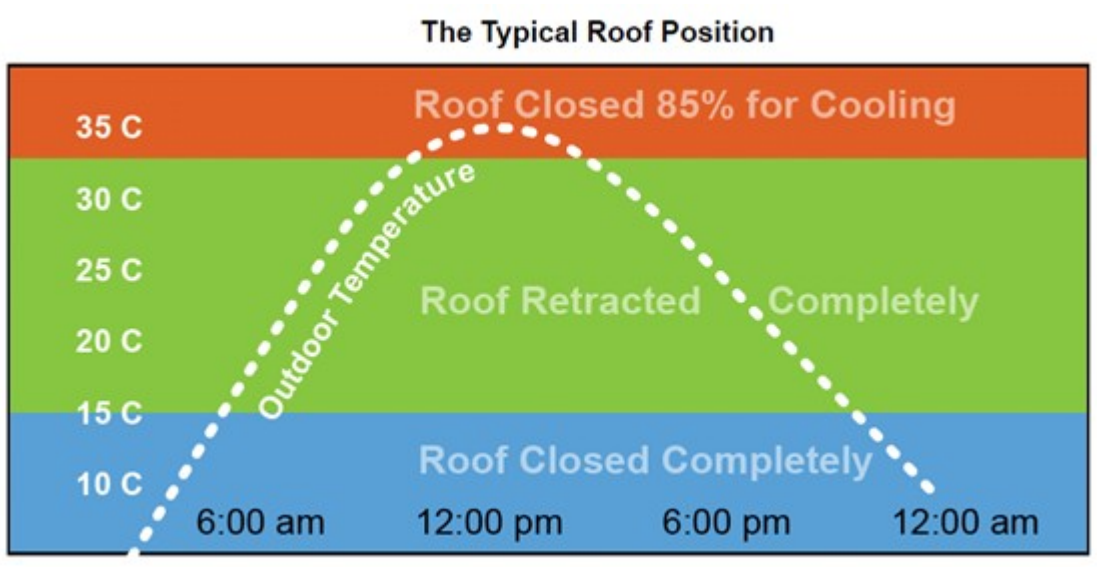
Fields

Introduction

The Field Managers on the Multigrow implements the Retractable Roof Production System (RRPS) control strategy developed by Cravo Equipment Ltd (www.cravo.com). It utilizes a black plate sensor whose temperature is used as the primary control element giving a good predictor of the plants temperature if exposed to the direct sunlight.

The goal of RRPS control strategy is to expose the plants to the natural outdoor conditions when outdoor conditions are ideal and close the roof / walls when the conditions are not. This section contains a brief description of the Cravo control strategy with some example values, all the temperatures & times below can be tailored to suit your climate and crop.



The Multigrow implements four control stages based on the Black plate sensor:

Stage	Abbr	Description
Greenhouse	**GH**	When the outside plate temperature falls too low (below 15°C) the roof/walls are closed to give a traditional greenhouse type environment
Wind Break	**WB**	When the temperature increases enough (above 18°C) the roof is retracted 100% to maximize direct sunlight but the walls are left closed to prevent wind chill
Open Field	**OF**	Once we reach 23°C the walls are retracted 100% to give an open field situation allowing the wind to help cool the plants
Shade House	**SH**	If the temperatures get too high (above 31°C) the roofs are now retracted to a crack position (10%-15%) to reduce infra-red radiation and reduce transpiration

In addition to these major control modes there are additional overrides for:

Override	Reason	Description
Humidity Increase	Too dry	Retract walls to 0% to reduce wind drying effects
Spray uniformity	Too windy	Retract walls to 0% and crack the roof to 10% to reduce wind drift
Rain protection	Too wet / raining	Retract roofs to 0% to stop rain falling onto the crop
Hail protection	Low barometric pressure	Retract roof and walls to 0% on detection of low Baro. Pressure to protect against storms
Crop protection	High winds	Override wall & roof positions to protect crops during high winds
Structure protection	Very high winds	Retract roof and walls 100% upon detection of very high winds to protect the structure
Fire Protection	Fire alarm	Retract roof & walls 100% if fire or smoke detector is installed to protect the structure

All of these have user-definable set points allowing full control of all mode/override triggers.

For detailed descriptions of the Retractable Roof Production System (RRPS) please refer to the *"Retractable Roof Greenhouses Book"* available from your local Cravo representative.

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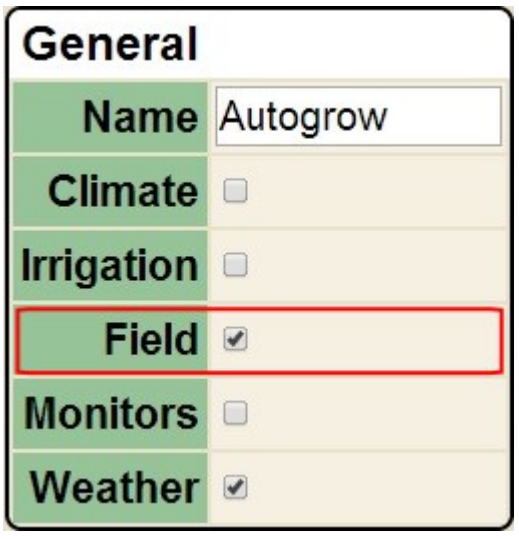
Adding a new Field Manager

The first step is to enable Field control on the Multigrow. Navigate to **Configuration > Overview** and tick the checkbox labelled **Field** in the General table.



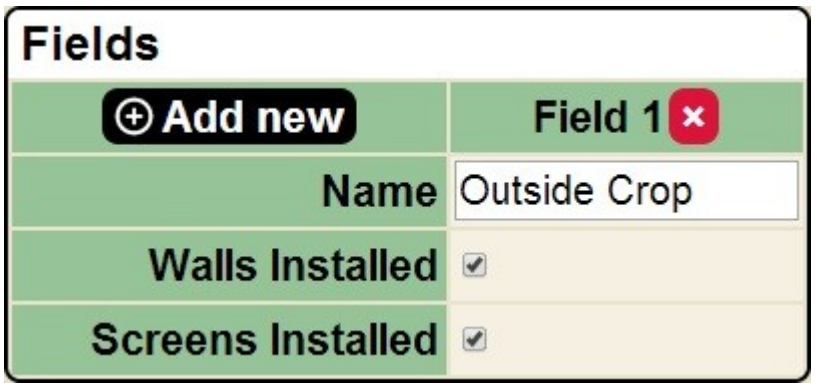
IMPORTANT: for proper control of a field section, a weather station should be used so wind speed information can be correctly fed into the system. See the *Weather* section of the manual for information of setting up this part of the system.

Pushing the **Save** button that appears will cause a Field tab to appear in the Primary Menu:

Adding a new Field

The weather and black plate information will be shared between fields

Navigate to **Configuration > Field > Summary** and push the **Add new** button to add a new individually controlled field:



Field	Description
Name	This is a name given to the ‘field’ this can be whatever you desire, it is however useful to make this something that identifies the crop or area it is controlling. This name will be used for any alerts that are generated for this field.
Walls installed	Ticking this box will install walls inside this field section.
Screens installed	Ticking this box will install screens (shades) inside this field section.

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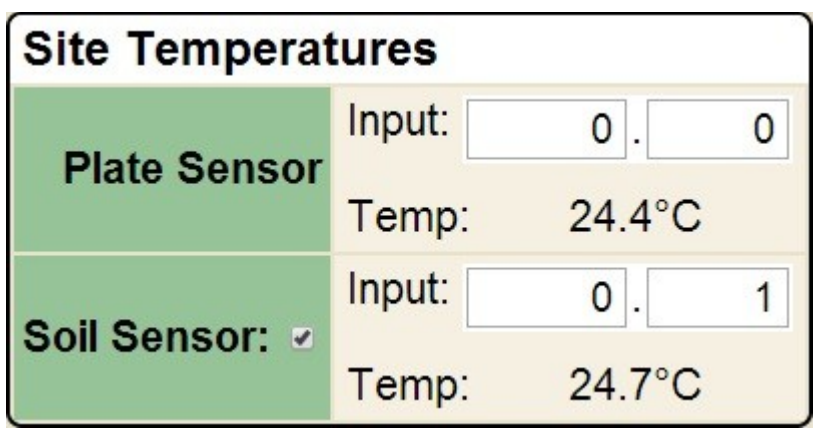
Site Temperatures

Each field system can use a common black plate and soil sensor. This means multiple field environments can refer to a single black-plate sensor for primary control. However, if needed, fields can be configured to use independent black plate and soil sensors (see the ***Sensors*** section below).



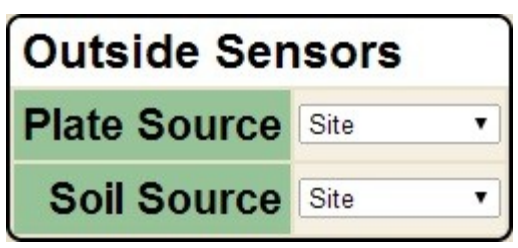
Field	Description
Plate Sensor	Here is where the site wide black plate sensor is configured. The Plate sensor is connected to a Remote temperature sensor into either the *T0* or *T1* slot. The input field determines which Remote temperature sensor to look at and which sensor slot is being used. The first box represents the address of the remote temperature unit itself. The second field defines which of the two sensors connected to the remote temperature unit to use.
Soil Sensor	An additional soil temperature sensor can also be installed for monitoring purposes which can be available to each field system. Ticking and activating the box next to the text will bring up an input box used to set up the temperature sensor in the same manner as the plate sensor input described above.

Sensors

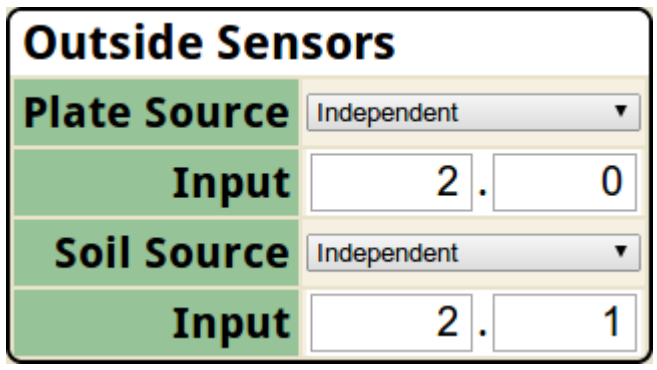
If needed, a Field can be configured to use independent sensors instead of the common sensors described above by navigating to **Configuration > Field > Outside Crop > Sensors**.

Outside sensors

The outside sensors refer to the sensors the field will use for both the plate black and soil temperatures. By default these are configured to use the common (Site) sensors configured in **Configuration > Fields**:



Changing the dropdown boxes from "*Site*" to "*Independent*", and pushing the **Save** button that appears introduces an **Input** address field, where the independent sensor address can be provided:



Inside sensors

The field system is trying to maintain a certain environment this inside temperature is used for alarm purposes

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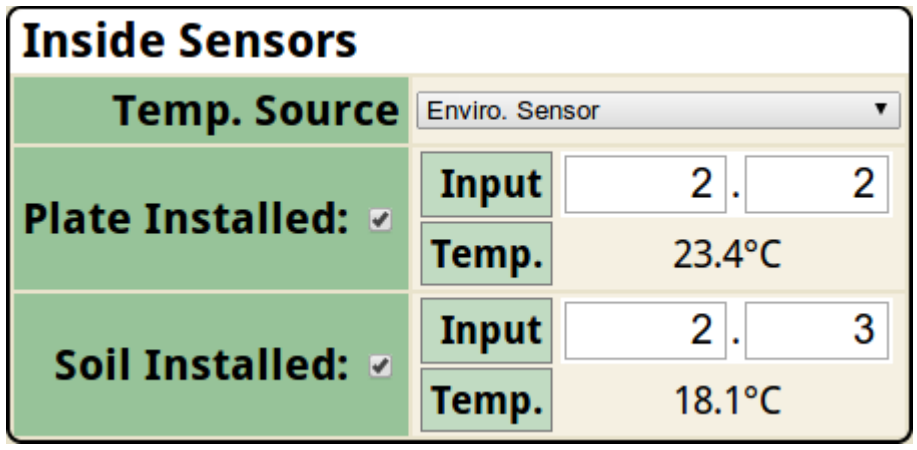
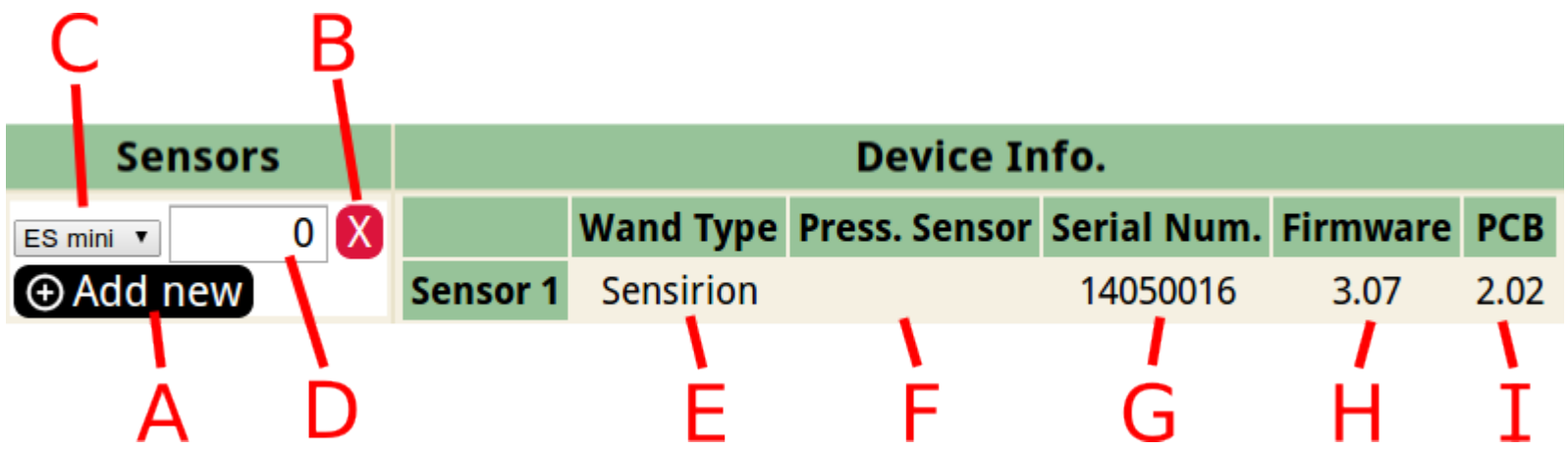


Field	Description
Temp. Source	The source that the Multigrow will use to determine the temperature inside the field, one of: • **Enviro. Sensor:** Use the environment sensor to provide the inside temperature for the field (make sure you have an environment sensor configured) • **Inside Plate:** Use an independent plate sensor as the inside temperature for the field • **Inside Soil:** Use an independent soil sensor as the inside temperature for the field
Plate Installed	When the **Temp. Source** is set to "*Inside Plate*", tick this box to specify the input address for the black plate sensor inside the field
Soil Installed	When the **Temp. Source** is set to "*Inside Soil*" tick this box to specify the input address for the soil sensor inside the field

Environment Sensors



Annotation	Name	Description
A	**Add new button**	Adds an EPM sensor
B	**Delete button**	Deletes an EPM sensor
C	**Sensor Type**	The type of sensor installed (unless you know you have an ES Maxi set this to ES Mini)
D	**Sensor address**	The address of the sensor. Each box must be populated with the corresponding address of the EpM device
E	**Wand type**	Type of temperature/humidity sensor fitted to the device
F	**Pressure Sensor**	Type of pressure sensor installed (only visible with ES Maxi devices)
G	**Serial**	Serial number of the device connected under that address
H	**Firmware**	Current version of the firmware this device is running
I	**PCB**	PCB version of the device

Sensor information is only available once the configuration has been activated by pushing the **Activate** button

Paired Outputs

The field system uses open and closed paired outputs in order to control each individual component in the system. Whether this be Roofs, Walls or Screens they all use the same paired output scheme. Each component will have common configuration, settings and readings in relation to the output.

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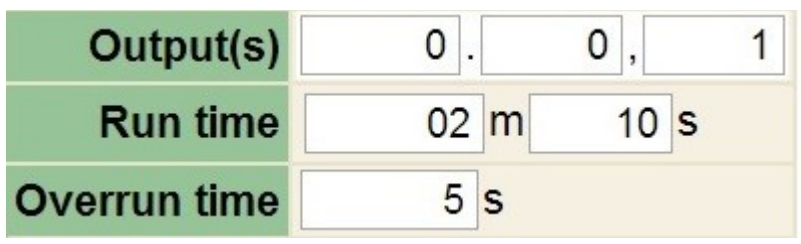
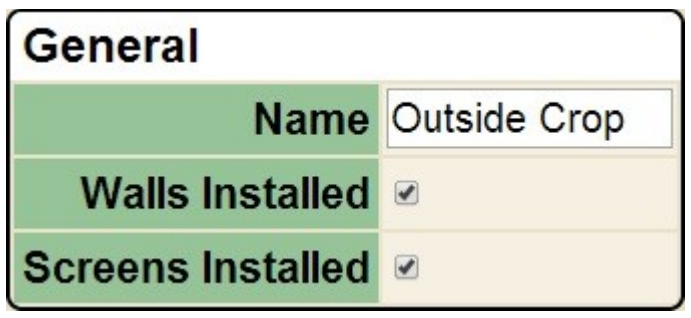
Configuration



Field	Description
Output	The output field is used to configure which outputs this component utilizes. The first box relates to the rotary address switch of an output expander, next box is the open output (driving this output causes the retraction or uncover), last box is the close output for the roof (driving this output causes the close or cover). In the example above the first box is set to 0 meaning use the output module whose rotary address switch is set to 0. The second box is set to 0 meaning use the first output on the output module for the open or retracting/uncovering output. Finally, the last box is set to 1 meaning use the second output of output module (0) for the closing/covering output.
Run Time	This is the time it takes for the component to go from completely closed to completely open (retracted/uncovered).
Overrun	This is the time that the output will be held on for when the component reaches a fully open or fully closed position. This ensures that the fully open / closed position is reached (by running longer than necessary and relying on the limit switches) in case there are any inconsistencies in the timing.

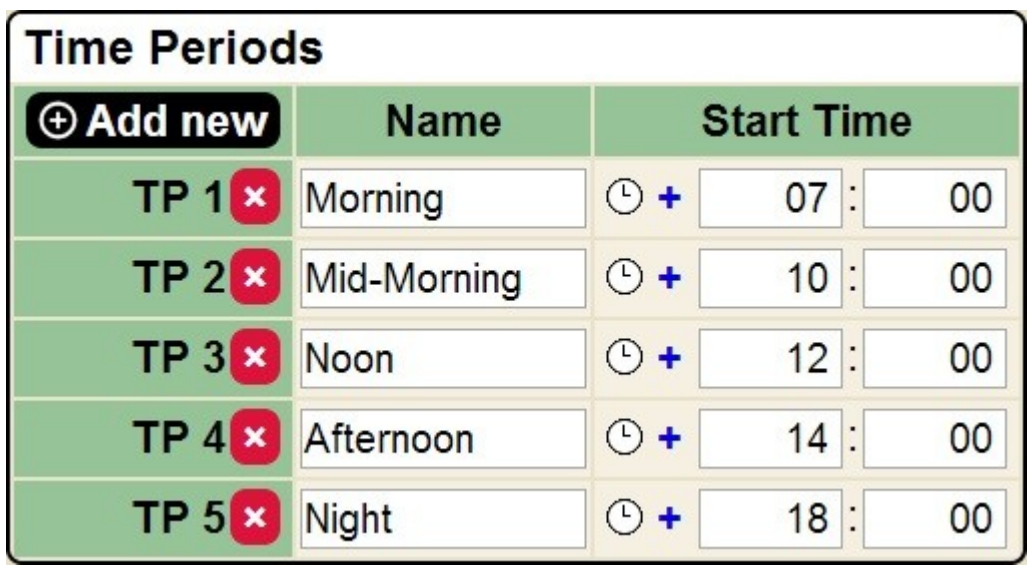
General

Under the general tab all the configuration variables from the summary page are available.



Time periods

Time periods for the system can be defined here; each field supports up to 5 time periods that can be defined as a time of day, offset from sunrise or offset from sunset. The name of the time period is not important for control but very useful when configuring time period dependent variables



Setting up a field

The summary tab on the settings page displays information relating to the current control mode of each field in the system.

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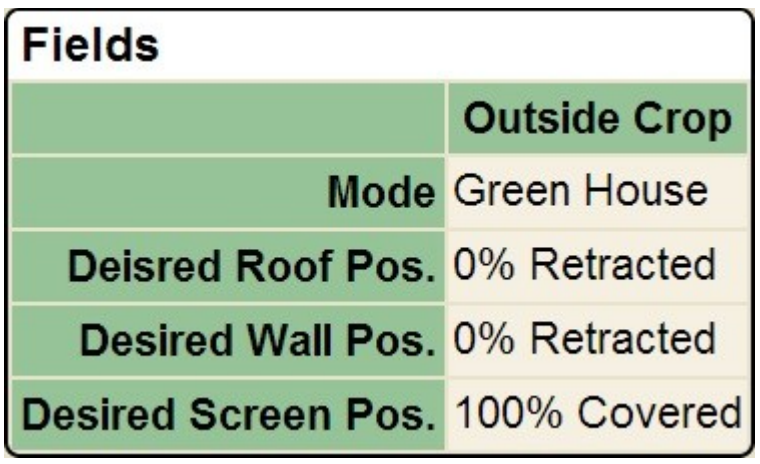

Field	Description
Mode	this is the current RRPS mode the field is using.
Desired Roof Pos.	The current roof position the field is trying to achieve. *Note: this may not reflect the actual roof position; it is what the control scheme is trying to apply (the desired position).*
Desired Wall Pos.	This is same as the above reading, Note this reading will only be displayed if there are walls installed in the field.
Desired Screen Pos.	Same as the above two variables, similarly this reading will only be displayed if there are screens installed in the field.

Settings

Note: This position is in percent open so for Roofs and Walls it relates to how far retracted the component is where as in the case of screens it will be how much the screen is uncovered. _Note:_ each output expander is divided into 2 banks outputs 0 – 4 are on bank 1 and outputs 5 – 9 on bank 2. If one output of this bank has a fuse blown state all other outputs on this bank will also not work.

Field	Description
Output state	Defines what the actual state of an output is in. One of: • *Manual:* The output switch is in the manual position • *User:* A user override has been applied to this output • *Running Closed:* A run closed operation is currently being performed • *Running Open:* A run open operation is currently being performed • *Opening:* Output is currently moving to a more open/uncovered position • *Closing:* Output is currently moving to a more closed/covered position • *Idle:* Output is not currently moving/overridden or manually controlled
Override	Ticking the box means the output will be overridden to the position specified in the edit box. This override is a true software override and will ignore any other control inputs from the system.
Switch pos.	Position of the physical switch on the output expander, if this is in manual the system has no control over this output. The controller cannot override a manual state, the switch must be physically turned to Auto.
Fuse	State of the fuse for this output, OK means the fuse is fine and output can be driven, blown means the fuse is damaged.

Output Resynchronization

Is a method used to make sure paired outputs (Open and Close) are actually running to the correct position. If the output is closing and opening a few times a day it is possible for a small drift in percentage to occur. The output may think it is at 50% open but is actually at 51%. Resynchronization of the output will fix this by driving the output to the fully open or closed position for the total run-time. Whether the output runs open or closed is based where the control system wants it to be.

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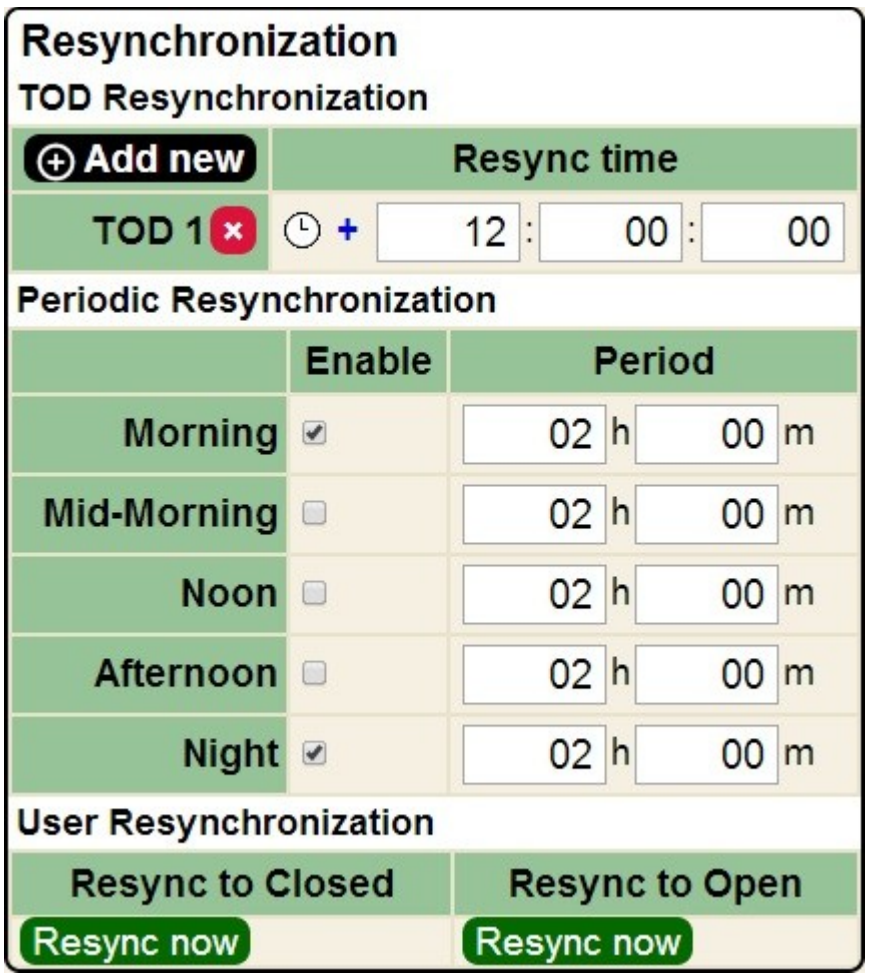


TOD Resynchronization: This will cause a resynchronization to happen at the time specified every day.

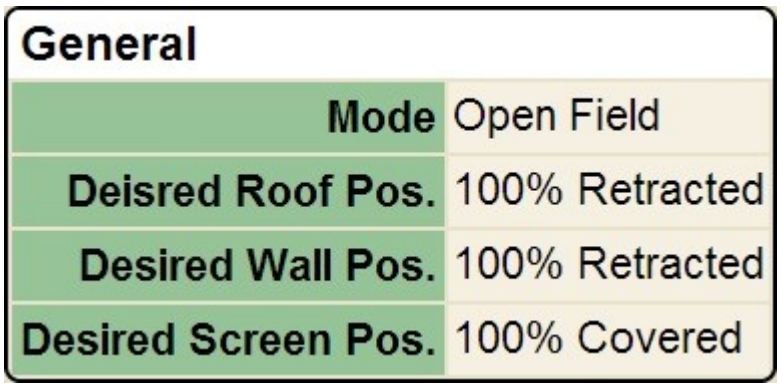
Periodic Resynchronization: Enables a periodic resynchronization throughout different time periods.

> In the example above the output will resynchronize at 12pm (midday) every day. The output will also resynchronize every two hours during the morning and night time periods.

User: The user can resynchronize the output to the open or closed position manually whenever they want by pressing these buttons.

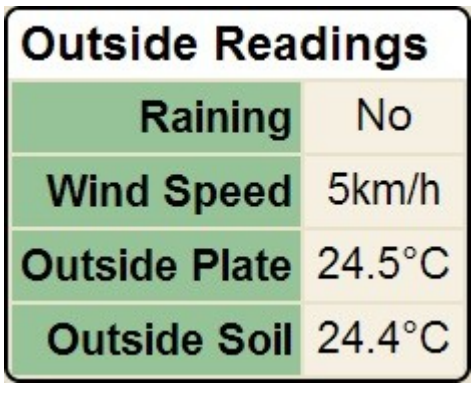
General

Holds information about the current state of the field system



Field	Description
Mode	This is the current mode of the field
Desired Roof Pos.	The retracted position of the Roofs which the system is trying to achieve
Desired Walls Pos.	The wall position the system is trying to achieve
Desired Screen Pos.	The screen position the system is trying to achieve

Outside Readings



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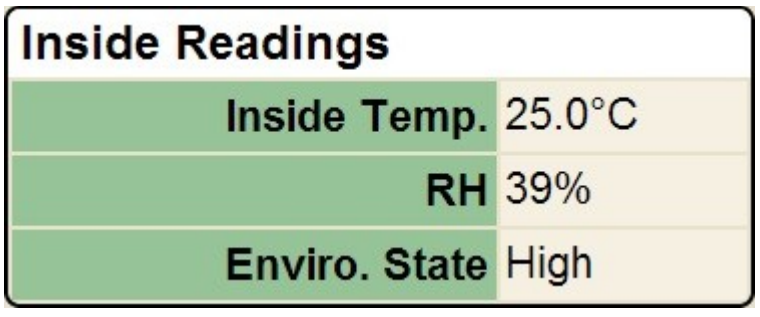
Field	Description
Raining	*YES* if the field detects a raining condition
Wind speed	The maximum gust for the last minute
Outside plate	Current outside plate temperature
Outside Soil	Current outside soil temperature. This is only visible if the soil sensor is not disabled under sensor configuration

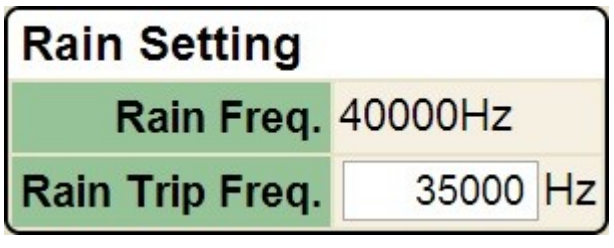
Inside readings



Inside temp: Current temperature of sensor defined under sensor config as the internal temperature for the field.
RH: Current RH, this reading needs to come from an environment sensor.
Enviro State: The state of input used for the fire protection override. The state is defined here as being either high or low (no-connection = high).

	Description
Inside temp	Current temperature of sensor defined under sensor config as the internal temperature for the field.
RH	Current RH, this reading needs to come from an environment sensor.
Enviro State	The state of input used for the fire protection override, defined here as being either high or low (no-connection = high).

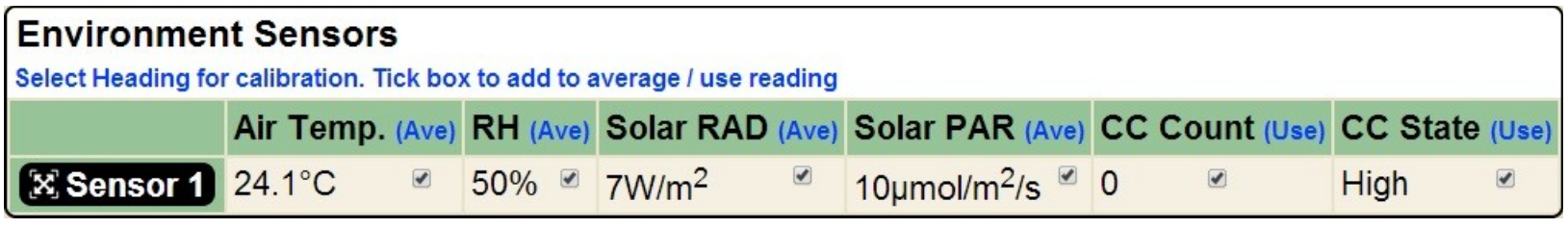
Rain Settings



Field	Description
Rain frequency	The current frequency coming from the weather station. The rain freq is inversely proportional to the rain intensity. A raining condition is detected when the Rain freq falls below the **Rain Trip Freq.** When it is raining enough outside to say it is raining this number should enter in the Trip Freq. box
Trip Freq.	Current frequency when the field will say it is raining. Setting a lower number here will reduce the sensitivity of the rain sensor, similarly a higher value will mean rain is detected at a lesser rain intensity

Settings

Sensors tab only contains Environment sensors. If multiple environment sensors are installed, each reading from each sensor can be averaged or used. Air Temp, RH, Solar RAD, Solar PAR can be averaged a crossed multiple sensors, if this is empty it is excluded from the average.



Expanded advanced settings

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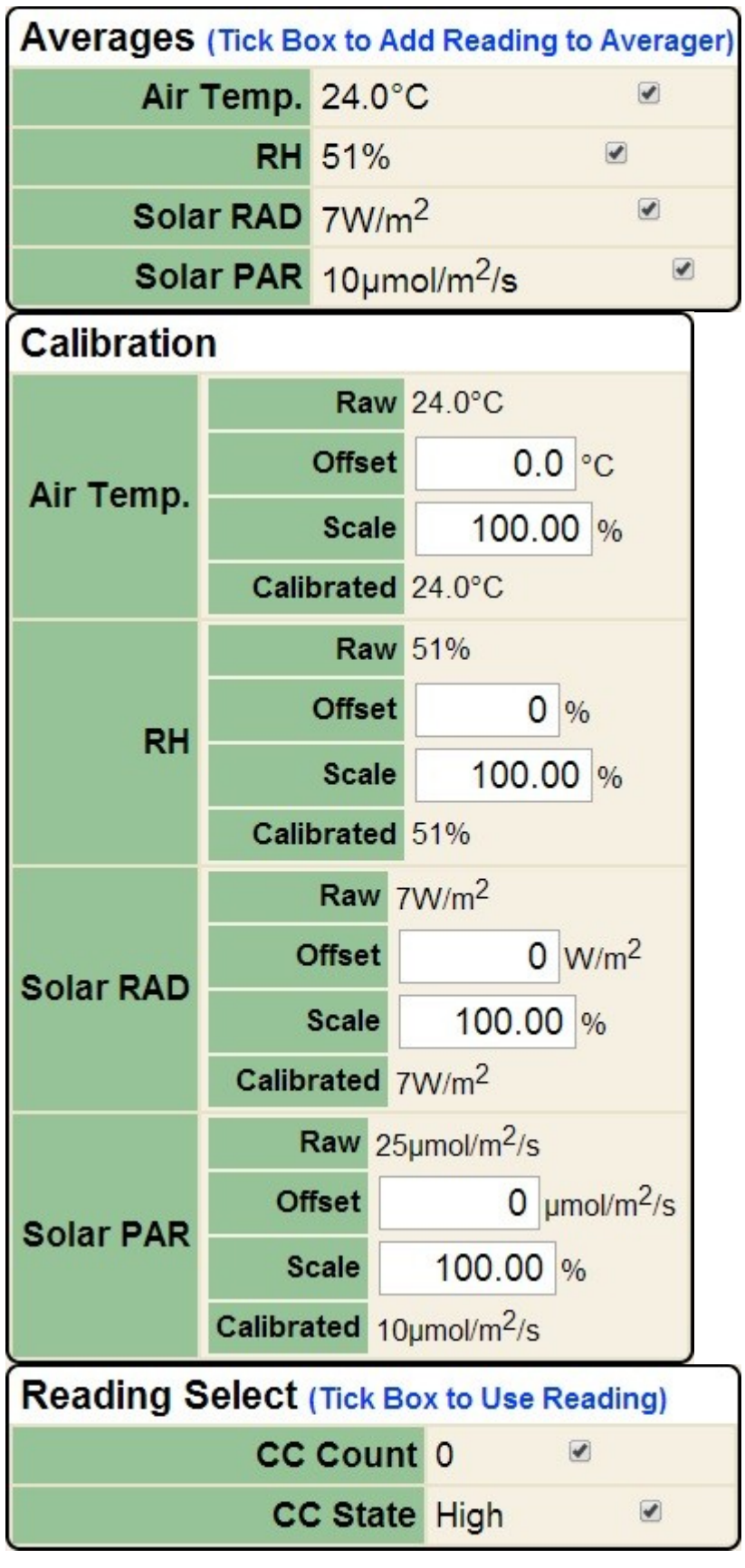

Air Temp, RH, RAD and PAR can be individually calibrated in case of readings drift. Averages and use me tick box are also available in this area.

Walls

Opening of the walls on a greenhouse with a roof that retracts has proven to be critical to being able to create the best possible growing conditions. Not installing roll up curtains on the sidewalls was one of the frequent mistakes made by the early users of retractable roof greenhouses.

While motorized roll up curtains are initially more expensive compared to stationary or seasonally removable poly, they allow the growers to maximize their return on investment since they are able to almost instantly create the full range of environments possible.

All information relating specifically to walls is found under each field on the Roofs / Walls tab.

Configuration

Add New: Pressing the Add New button under the walls box will add a new wall component to the field system. Each field can support up to 4 individually driven walls.

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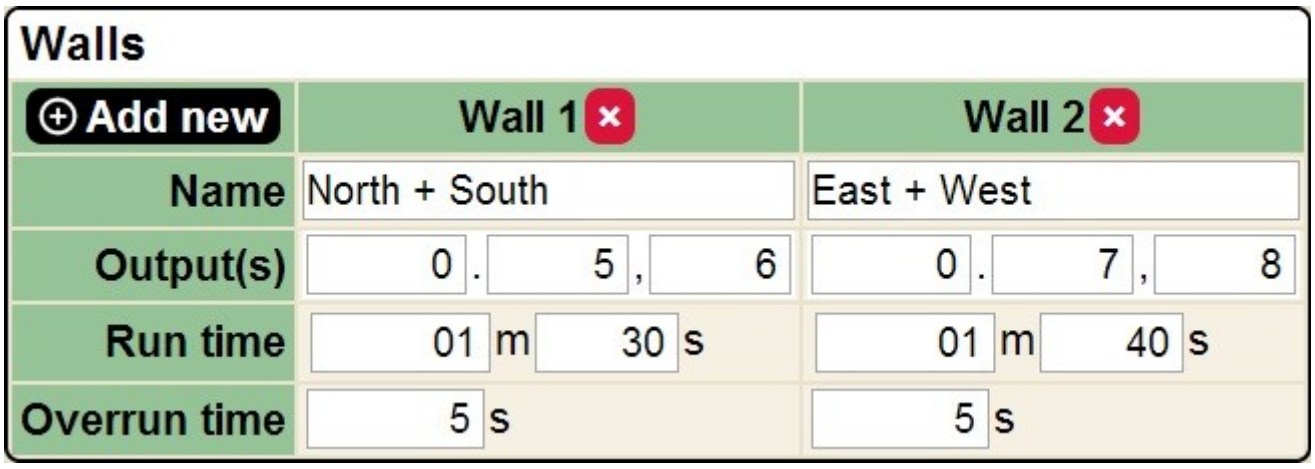
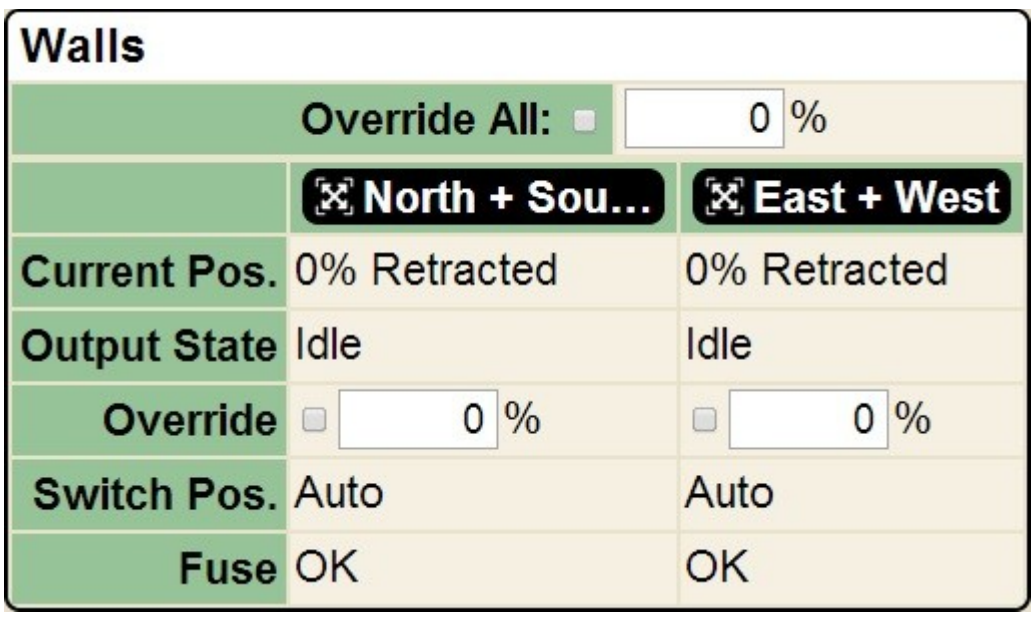


Field	Description
Name	This is a unique name relating to each wall, this name will be used for alerting and displayed in other places around the system, it is important to name the wall something meaningful to help identify which wall you are currently look at
Output Configurations	The rest of the readings relate specifically to a generic paired output, please refer to the section *Paired Output Configuring* for information on configuring this output

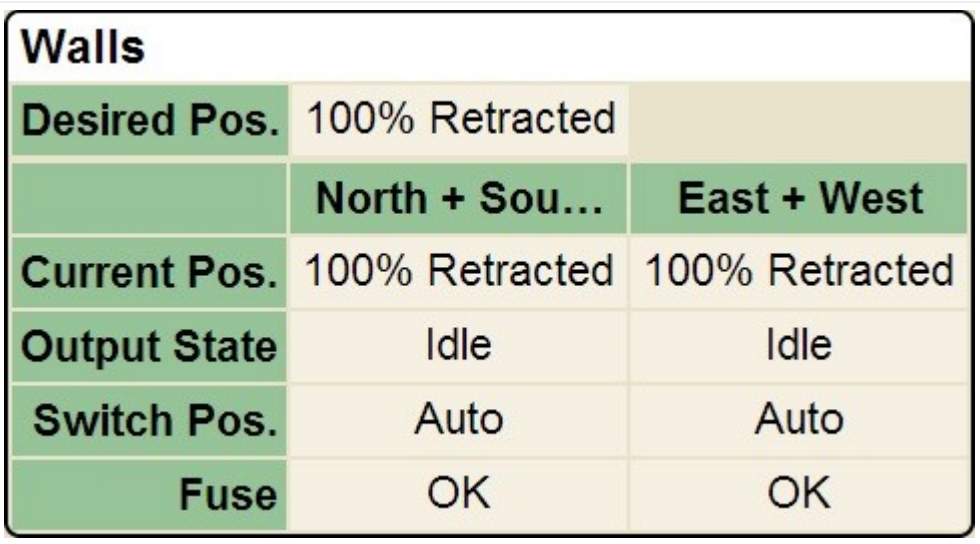
Settings

The walls box contains general settings for each wall which are displayed here, each walls advanced settings are available under the expanded menu, clicking the title button to bring this up.



Field	Description
Override All	Ticking this box will override all walls to the position specified. (*Note:* this position is in % open or retracted)
Current Pos	Current retracted position of the wall
Output Settings	See section paired output settings for a description of these
Advanced Setting	The only advanced settings for a roof is the resynchronization settings, please refer to section *Paired Output Settings* for how to set these.

Readings



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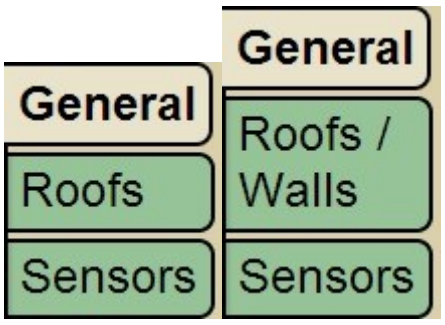
Field	Description
Desired Pos	This is the percentage retracted the control scheme is trying to drive the walls to.
Current Pos	the current retracted position of the wall.
Output Readings	The rest of the readings relate specifically to a generic paired output, please refer to the section *Paired Output Readings* for descriptions of these.

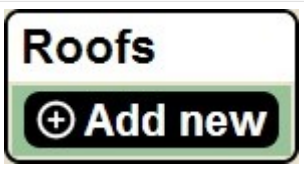
Roofs

The retractable roofs lie at the heart of the RRPS control strategy. They allow the installation to operate as either an open-field or a greenhouse to match outside conditions.

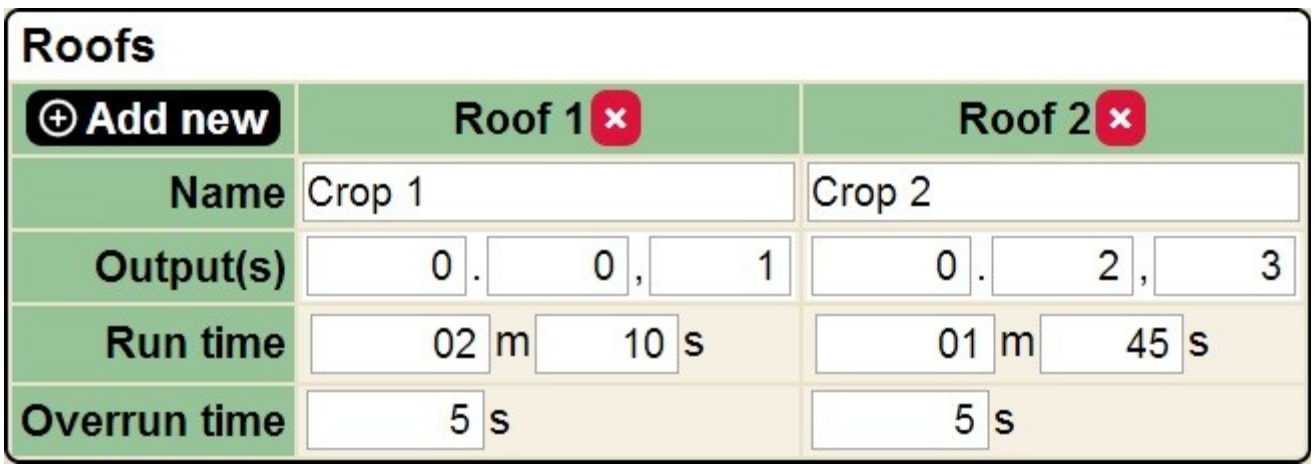
All information relating specifically to roofs is found on the Roofs or Roofs / Walls tab.
The tab name changes depending on whether walls are installed in the field or not.



Configuration



Add New: Pressing the *[Add New]* button under the roofs box will add a new roof component to the field system. Each field can support up to 4 individually driven roofs.



Field	Description
Name	This is a unique name relating to each roof, this name will be used for alerting and displayed in other places around the system, it is important to name the roof to something meaningful to help identify which roof you are currently looking at
Output Configurations	This describes which outputs are used to drive the open / close operations for the roof(s). Please refer to section 3.1 Paired Output Configuring for information on configuring this type of output

Settings

The roofs box contains general settings for each roof. The roofs advanced settings are available under the expanded menu, clicking the title button to bring this up.

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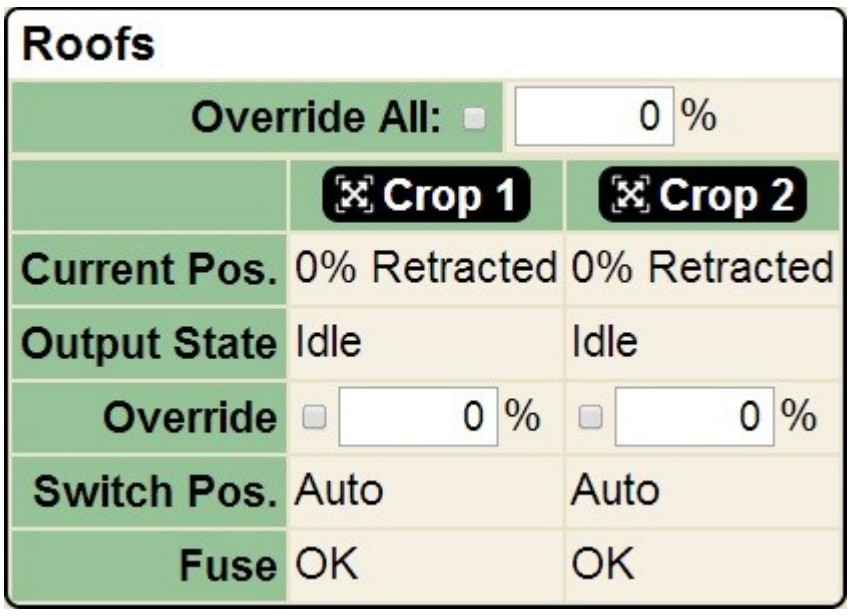
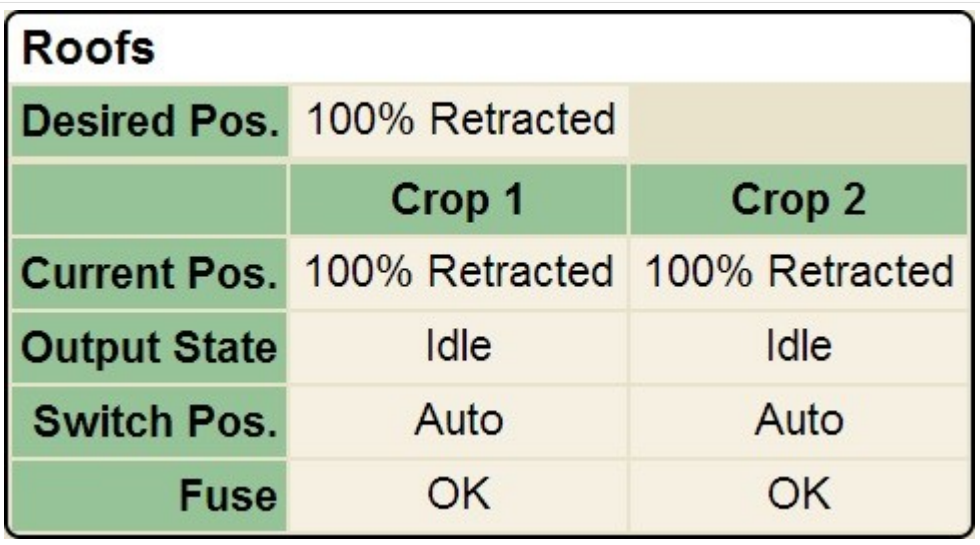


Field	Description
Override All	Ticking this box will override all roofs to the position specified. (Note this position is in % open or retracted)
Current Pos	Current position of the roof, in percentage retracted.
Output Settings	See section *paired output settings* for a description of these
Advanced Setting	The only advanced settings for a roof is the resynchronization settings, please refer to section *Paired Output Settings* for how to set these.

Readings



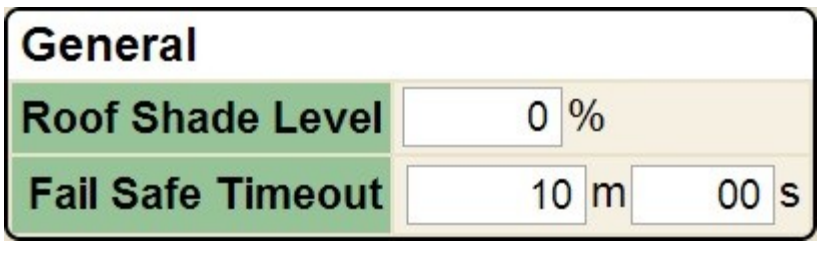
Field	Description
Desired Pos	The percentage retracted the control scheme is trying to achieve.
Current Pos	The current retracted position of the roof.
Output Readings	The rest of the readings relate specifically to a generic paired output, please refer to the section *Paired Output Readings* for descriptions of these.

Screens

The Multigrow also allows control of internal shade curtains to provide additional light level control to protect the crop.

Configuration

General



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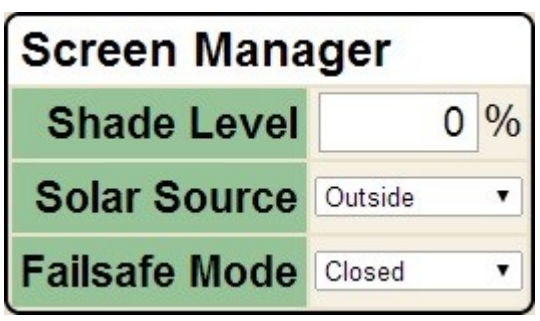
Field	Description
Roof shade level	The amount of light that is blocked when the roof is completely closed
Fail safe timeout	Since the screens decision making is driven by the solar reading it is important the system knows what to do if this value is lost. The fail safe timer is started whenever the solar reading is lost; once the timer exceeds the time specified here the screens will be forced to their individual failsafe positions. This is used to protect the plants from excess exposure to bright light.

Screen manager



Shade level: This is the amount of light blocked by the screen when used and is defined by the manufacturer of the screen.

Solar Source: This is the solar source the screen manager uses to make its decision on whether to open or close (cover) the screen.

Outside: The manager will use the raw outside solar reading. (*Note:* a weather station must be installed for this to be used). **Calculated:** This is the effective light getting into the compartment based on whether the roof and screen is currently open or closed. *Note:* the shade level configuration of the roof and screens must be correct for this to work effectively *and* a weather station must be installed.

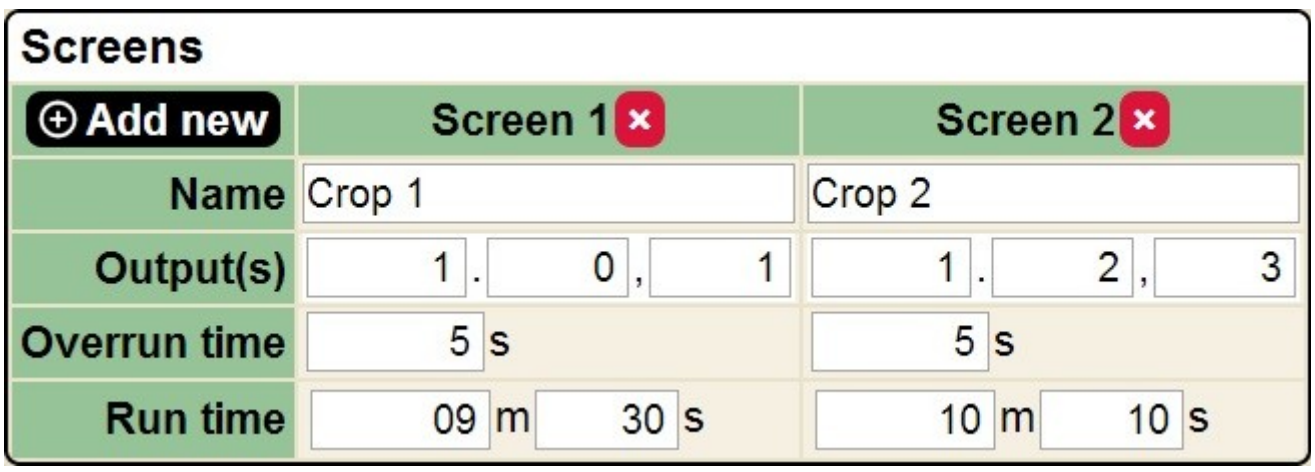
Inside: This will use the field's internal solar reading from an Environment Sensor to make decisions an ES must be installed to use this

Failsafe Mode: The position of this screen if a failsafe mode is requested, Closed is 100% covered, open 0% covered.

Screens

The settings defined in this block are related specifically to screen outputs.

Add New: Pressing the Add New button under the screens box will add a new screen component to the field system. *Each field can support up to 4 individually driven screens*.



Name: This is a unique name relating to each screen, this name will be used for alerting and displayed in other places around the system, it is important to name the screen something meaningful to help identify which wall you are currently look at.

Output Configurations: The rest of the readings relate specifically to a generic paired output, please refer to the section *Paired Output Configuring* for information on configuring this output.

Settings

General

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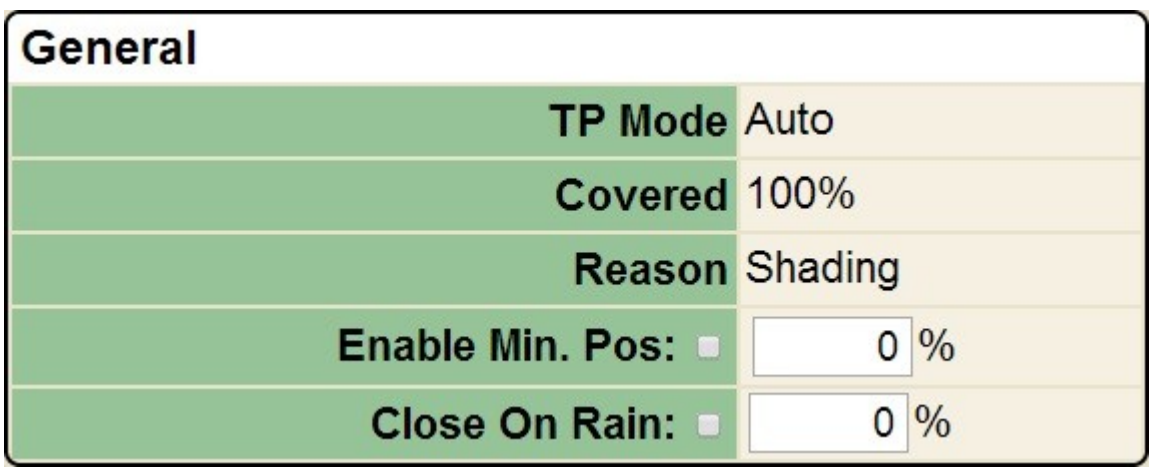
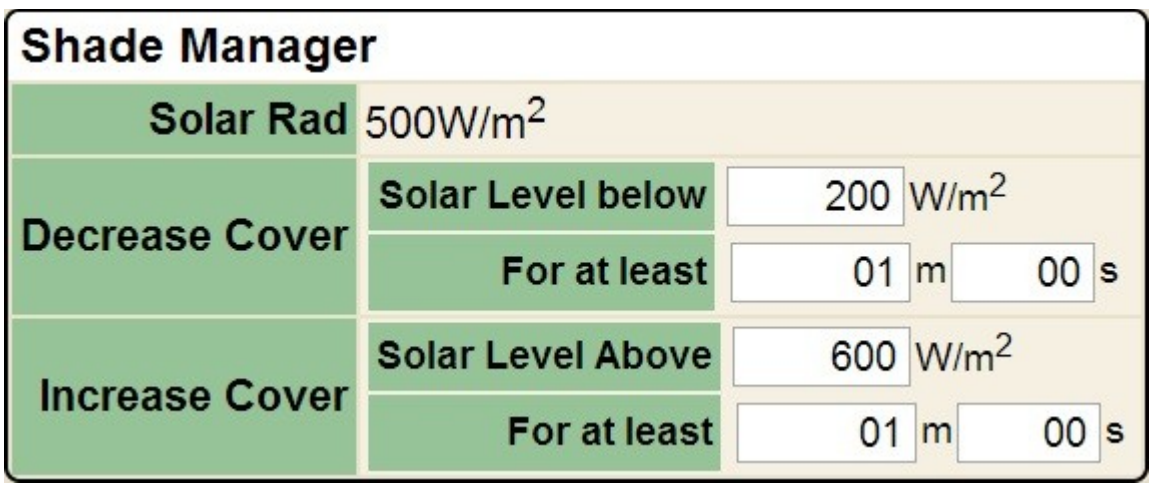


Field	Description
TP Mode	Current time period mode of screens, this needs to be auto to use solar control
Covered	Current position of screens
Reason	The reason the screen is in this position
Enable Min. Pos	Minimum position for the screen. This is the inverse of covered, 10% here means the screen can only cover 90%
Close On Rain	If it is raining the screen will close to position specified, also inverse of covered

Shade Manager

The shade manager uses the solar source specified in the configuration to make decisions on whether to open or close the screens.



Field	Description
Solar RAD	Current solar reading from the source which is used to control the position of the screens with in the field
Decrease cover	If the solar level is below this level for at least the time specified open the screen (uncover)
Increase cover	if the solar level is above this level for at least the time specified close the screen (cover)

Note: If the solar level is between these values the screens will remain in the last state they moved to. If the solar was below 200 then up till 500 it will remain uncovered. The level must get to 600 before the screen covers. Similarly if the value was above 600 and it drops to 500 the screen will remain covered. It has to get to 200 before moving.

Time periods:

Each screen has the ability to be overridden to a certain position per time period. This mode is specified in the box below. If not in automatic (Auto) mode the screen will be at the position specified for the entire time period (Open/Uncovered or Closed/Covered). Screen control based on light levels will only occur if the Mode is set to Automatic (Auto).

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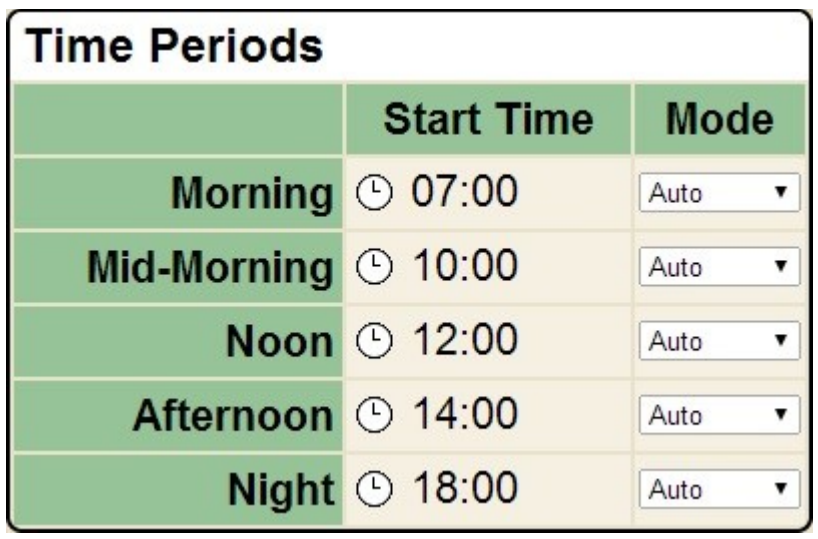
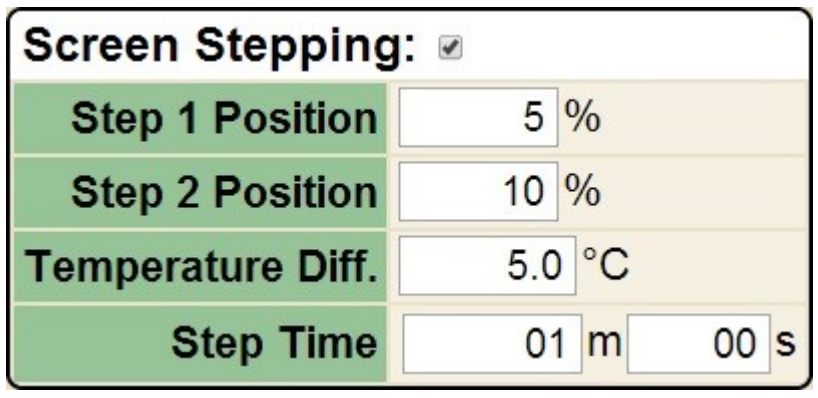


Screen Stepping

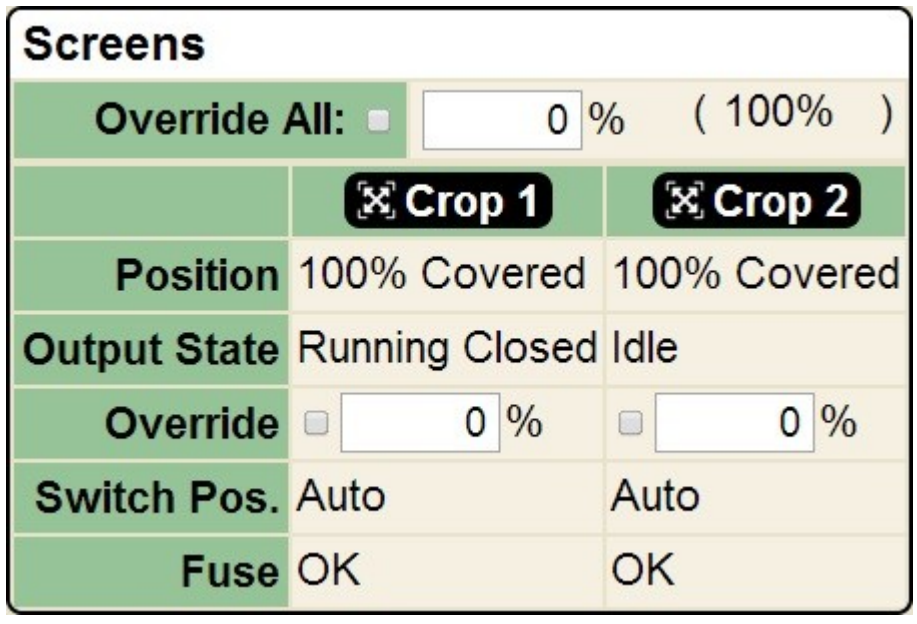
If the screen is operating and the outside temperature is a lot colder than under the screen sudden exposure to this cold air can shock the plants. Stepping is a way to stop this, stepping will cause the screen to slowly open (uncover) in two steps. The screen will move to the first position and wait for the time specified, then move to the second and wait for the time specified before fully opening. Note this requires both a valid outside and inside air temperature reading to work.



Field	Description
Step 1 Position	The Position the screen will stop at during its first step, note this is in percentage open or uncovered. The example shows this as 5% open or uncovered which means the screen will stop at 95% cover in the first step
Step 2 Position	This is the same as the above setting, except it defines the position of the second step
Temperature Diff	This is how much colder the outside temperature needs to be in order to step the screen
Step time	This is the time the screen must wait in each step before moving to the next

Screens

This box contains general output settings for each screen, each screens advanced settings are available under the expanded menu, clicking the title button to bring this up.



Field	Description
Override All	Ticking this box will override all screens to the position specified. (Note this position is in % open or uncovered)

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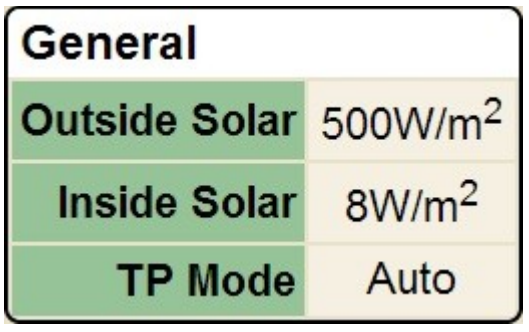
Field	Description
Output Settings	See section *paired output settings* for a description of these
Advanced Setting	The only advanced settings for a roof is the resynchronization settings, please refer to section *Paired Output Settings* for how to set these

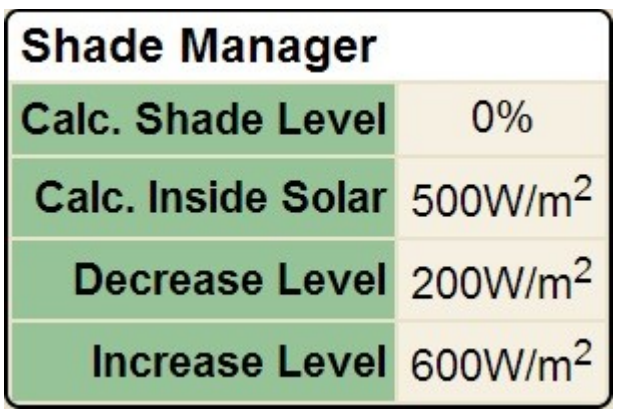
Readings

General



Field	Description
Outside solar	This is the raw reading being supplied by the weather station
Inside solar	This is the reading being supplied by an internal solar sensor on an Environment sensor
TP Mode	The current TP (time period) mode the shade manager is using

Shade Manger



Field	Description
Calc. shade level	This is the shade level currently being provided to the plants this takes into account whether the screen is covered or not and if the roof is closed
Calc. inside solar	This is a purely calculated reading based on the outside solar and the current calculated shade level
Decrease level	This is the level from the settings page which will cause the screen to open/uncover. This value can be changed on the settings page
Increase level	This is the level from the settings page which will cause the screen to close/cover. This value can be changed on the settings page

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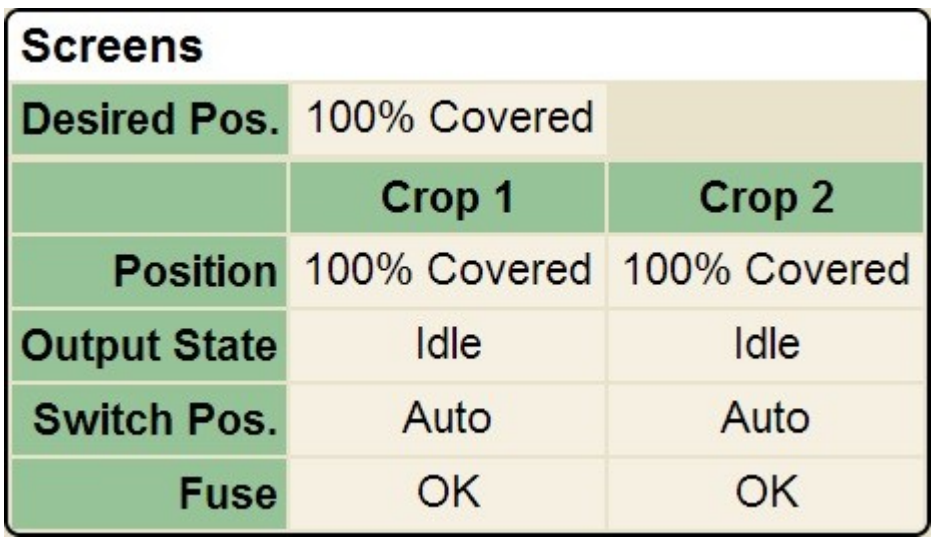
Screens

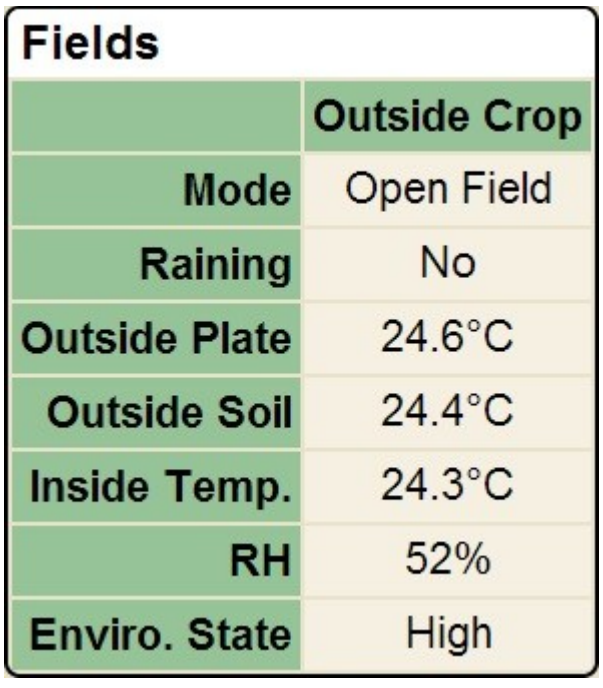


Screens		
Desired Pos.	100% Covered	
	Crop 1	Crop 2
Position	100% Covered	100% Covered
Output State	Idle	Idle
Switch Pos.	Auto	Auto
Fuse	OK	OK

Field	Description
Desired Pos	This is the percentage covered the control scheme is trying to drive the screens to
Current Pos	is the current retracted position of the wall
Output Readings	The rest of the readings relate specifically to a generic paired output, please refer to the section *Paired Output Readings* for descriptions of these

Readings

This box shows the general readings of the field that influence the mode.



Fields	
	Outside Crop
Mode	Open Field
Raining	No
Outside Plate	24.6°C
Outside Soil	24.4°C
Inside Temp.	24.3°C
RH	52%
Enviro. State	High

Field	Description
Mode	Current operating mode of the field system.
Raining	Whether the field has determined it is currently raining
Outside Plate	Main control temperature for normal operation modes, this can be from either a local temperature sensor or a site wide black plate sensor.
Outside Soil	This reading is not used for control but to give an indication of the temperature at the plants soil level. *Note: this variable will not be visible if the outside soil temperature is disabled.*
Inside Temp.	This reading shows the current air temperature inside the field, this can be sourced from different places and is only used to drive specific alarms.
RH	Current Relative Humidity inside the field, for this value to be valid an Environment sensor must be installed in the inside the field.
Enviro. State	This is the current state of the CC input for the Enviro. Sensor This is used in conduction with the fire protection override on the system. An ES must be installed for this to be displayed correctly.

Site Readings

This box contains the current site wide readings that affect the field control mode.

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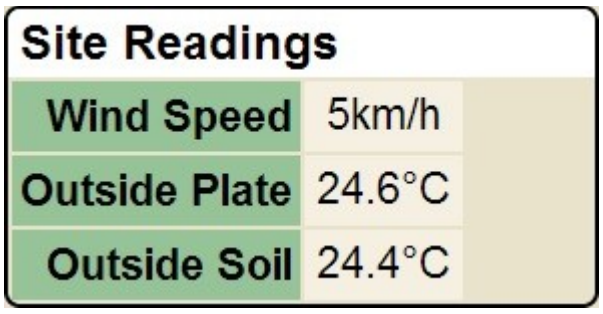


Field	Description
Wind Speed	Current wind speed from the weather station. If a weather station is not installed or this reading appears as XX, then all wind speed controls will not work on the fields installed.
Outside Plate	Current temperature of the outside black plate which can be shared across multiple fields. If this temperature appears as XX and a field is not using a local temperature sensor then control for this field will not function correctly.
Outside soil	Site wide temperature used for monitoring, this will only be displayed if installed. Field control will not be affected on the loss of this reading.

Readings

Output state: Defines the measured state of the output. Refer to the table 3.2 for further descriptions. **Switch pos.:** Refer to output settings for description of this reading. **Fuse:** Refer to output settings for description of this reading

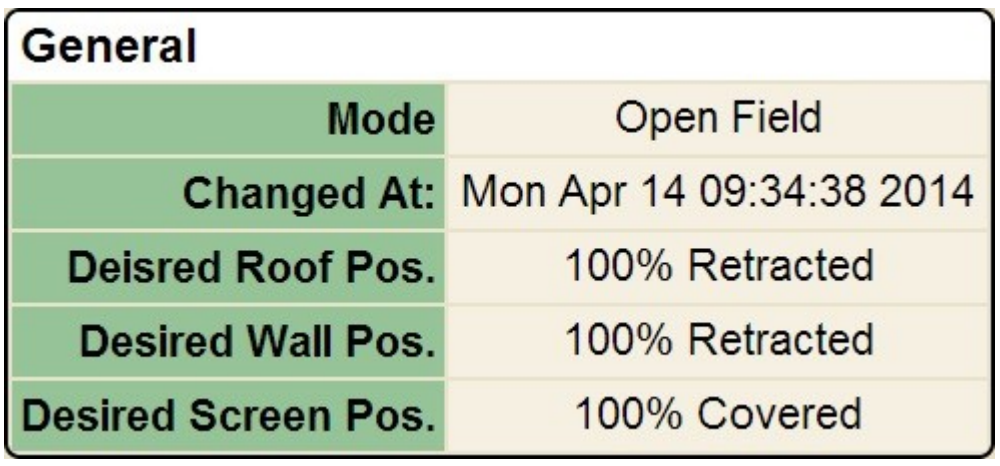
General

Each field has a number of generalized settings which can be found on the top tab settings or configuration page labelled as General, and the status tab on the readings page. These areas are used to display the current general information for the field and any generalized setting or configuration options which are not specific to a particular component within the field.

Readings

General

Main reading page contains all relevant information pertaining to the general state of the field in focus.



Field	Description
Mode	Current control Mode the field is in
Changed at	The time this mode was entered. This will be updated anytime a mode or override change occurs on the system
Desired Positions	The desired positions for each component of the system. Roofs are always present in this box, walls and screens are only shown if they are installed in this field

Outside reading

This box is the same one as displayed on the General settings tab for a field. Defined under section 4.2.

Inside readings

Similar to the setting general tab with a few extra readings

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Inside Readings	
Inside Temp.	24.2°C
Air Temp.	24.2°C
RH	49%
VPD	1.538kPa
Dew Point	12.8°C
Solar RAD	7W/m^2
Solar PAR	21µmol/m^2/s
Enviro. State	High

Field	Description
Inside temp	Temperature of the current source being used for inside temperature
Air Temp	Current air temperature as measured from the Environment sensor
RH	Measured relative humidity from the environment sensor
VPD	Calculated from Air temperature and RH from the environment sensor
Dew Point	Calculated Dew point based on ES readings
Solar RAD	Measured light radiation from the ES
Solar PAR	Measured light within the PAR region from the ES
Enviro. State	State Of Contact closure for ES

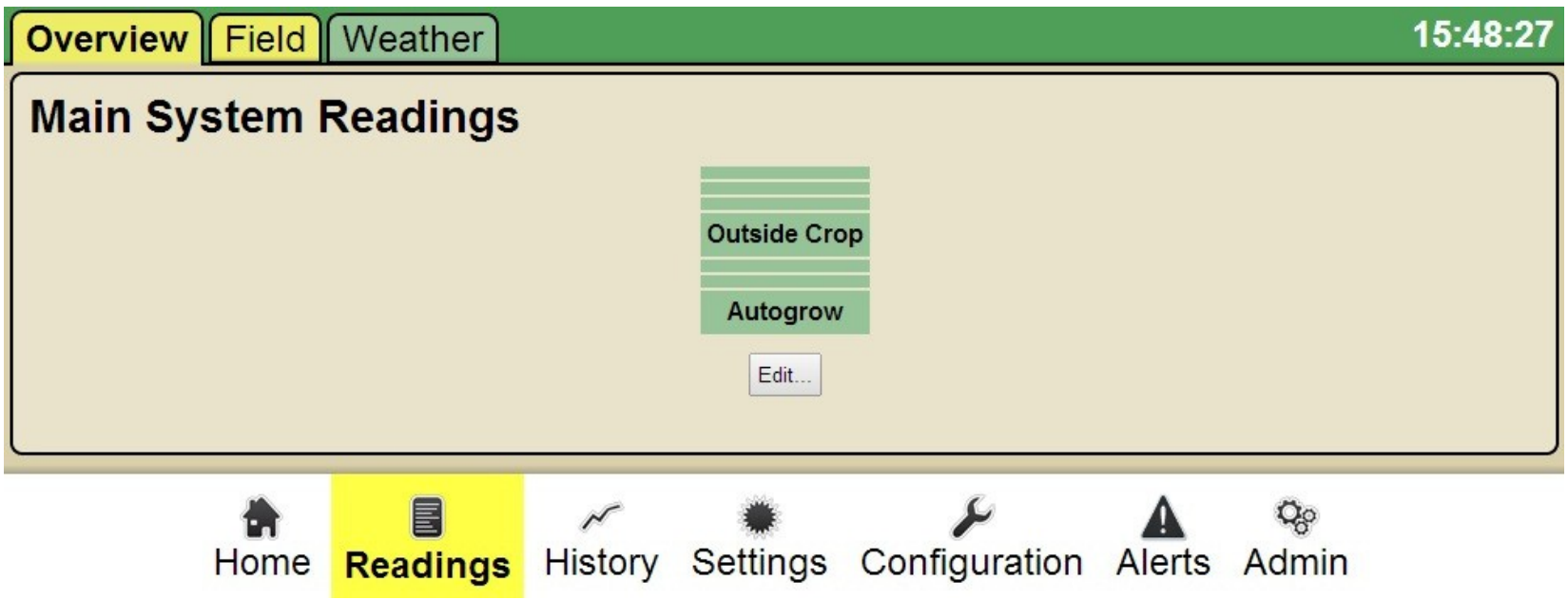
Actual Positions

Current actual positions of every roof, wall and screen installed in the field. *These are separated by a comma*.

Actual Positions	
Roofs (Retracted)	100%, 100%
Walls (Retracted)	100%, 100%
Screens (Covered)	100%, 100%

Overview Page

Each field has general settings which can be selected to be viewed on the overview readings page.



The grower can tailor the readings shown on the overview page by pressing the [edit] button and choosing appropriate selections for each drop-down menu.

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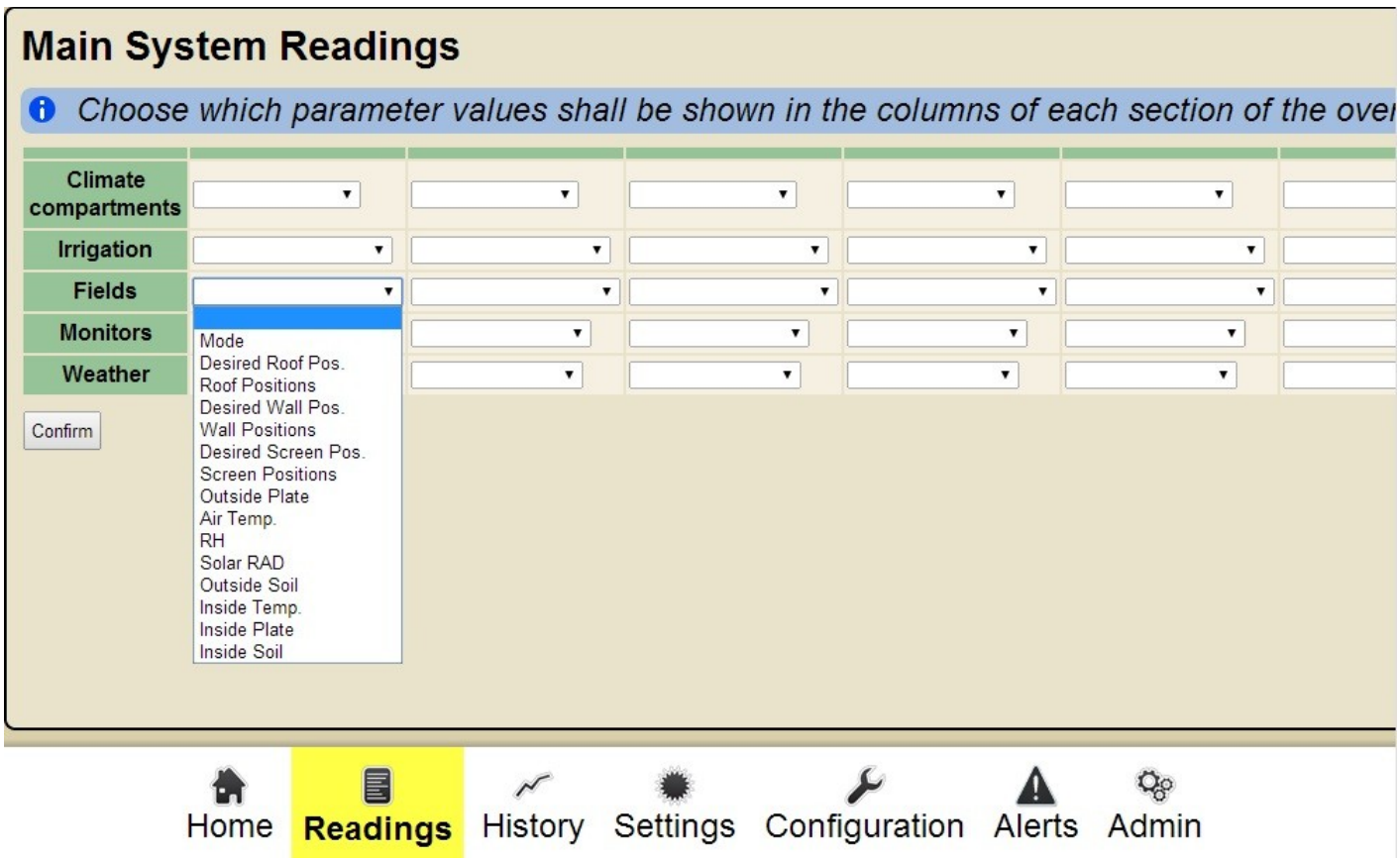
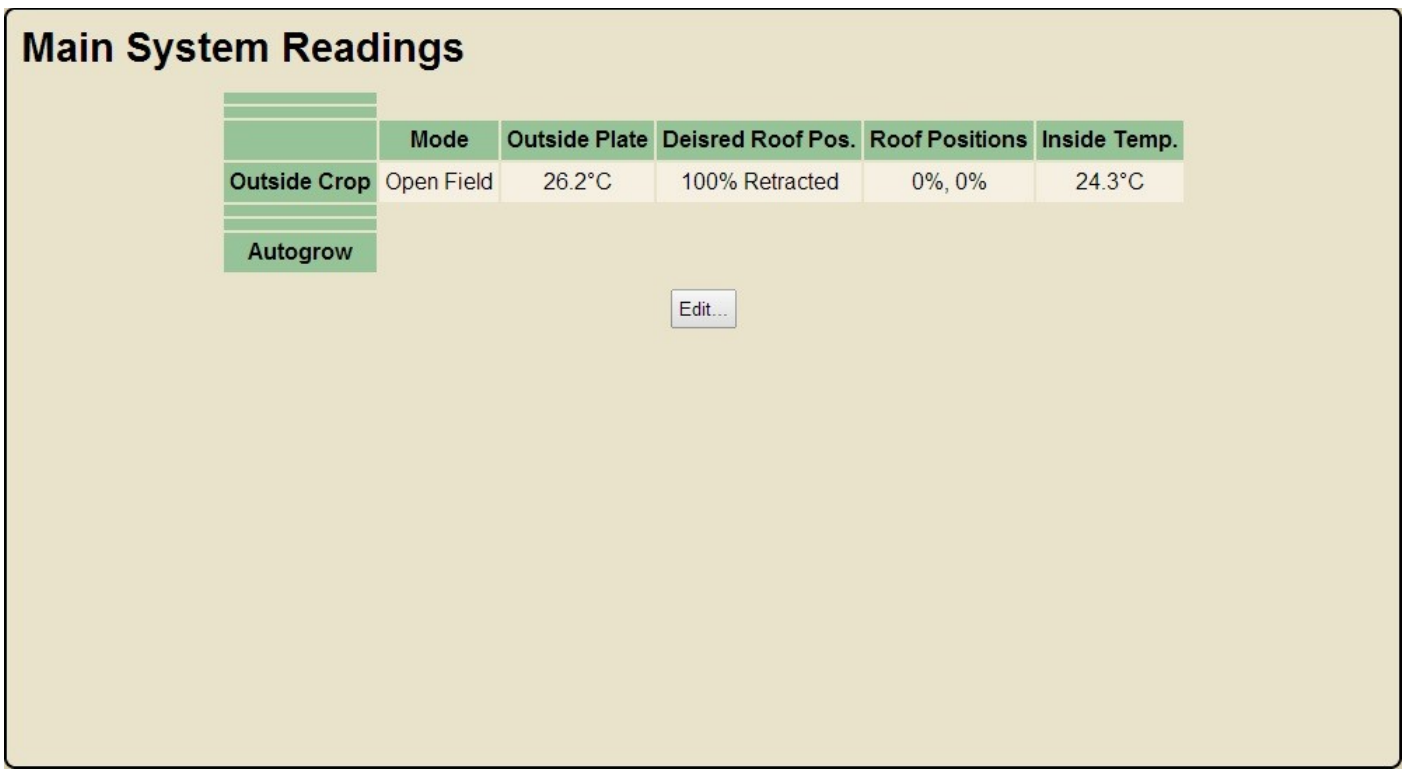
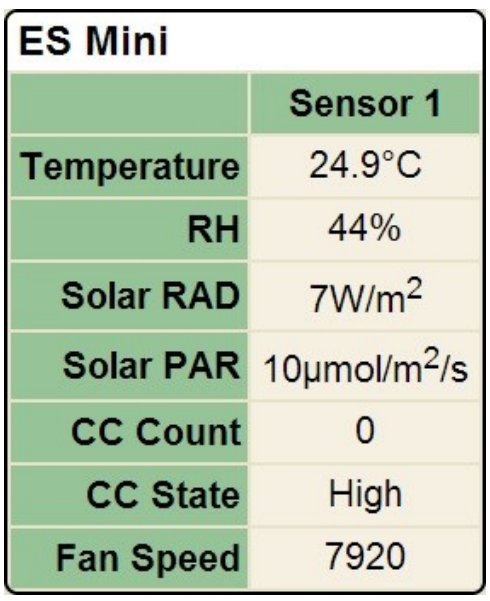




Readings

ES Mini:

All Environment sensors currently installed in the system will be displayed in this box along with their current readings.



Field	Description
Temperature	Current Air Temperature from the devices Wand sensor

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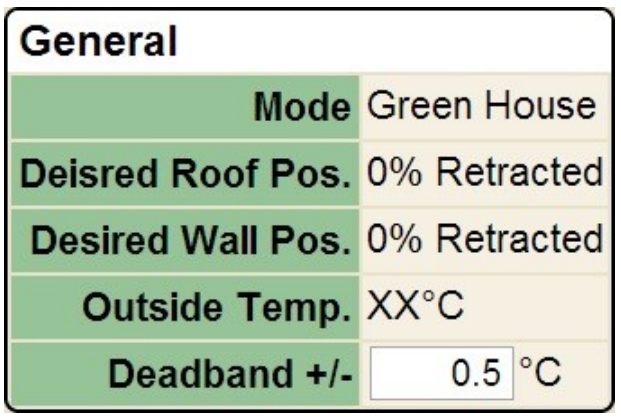
Field	Description
RH	Current relative humidity from device *Note:* If both Air temperature and RH are reading XX the wand sensor could be damaged or not installed properly. Check this sensor if this condition arises.
Solar RAD	This is the current solar radiation the sensor is being exposed to
Solar PAR	This is the current solar PAR (Photosynthetic Active Radiation) the sensor is being exposed to.
CC Count	This is the amount of time the CC input or contact closure input has changed states on the device. If this connected to a fire alarm as is increase in count rapidly, there may be some fault this connection.
CC State	Current state of the contact closure input
Fan Speed	Environment sensors contain a small aspiration fan in order to ensure air flow over the Temperature/RH sensor for accurate readings. This speed can vary quiet a lot depending on the age and type of the fan. The main reason to display this reading is to check that the fan speed is running. If the fan is currently not running the Air Temperature and RH readings from this device may be inaccurate. Check the state of the device and the fan if this value is ever 0

Control Modes:

Modes are the main control methodology for a field system. They use the temperature from the black plate sensor in order to open or close the Roof and Walls.

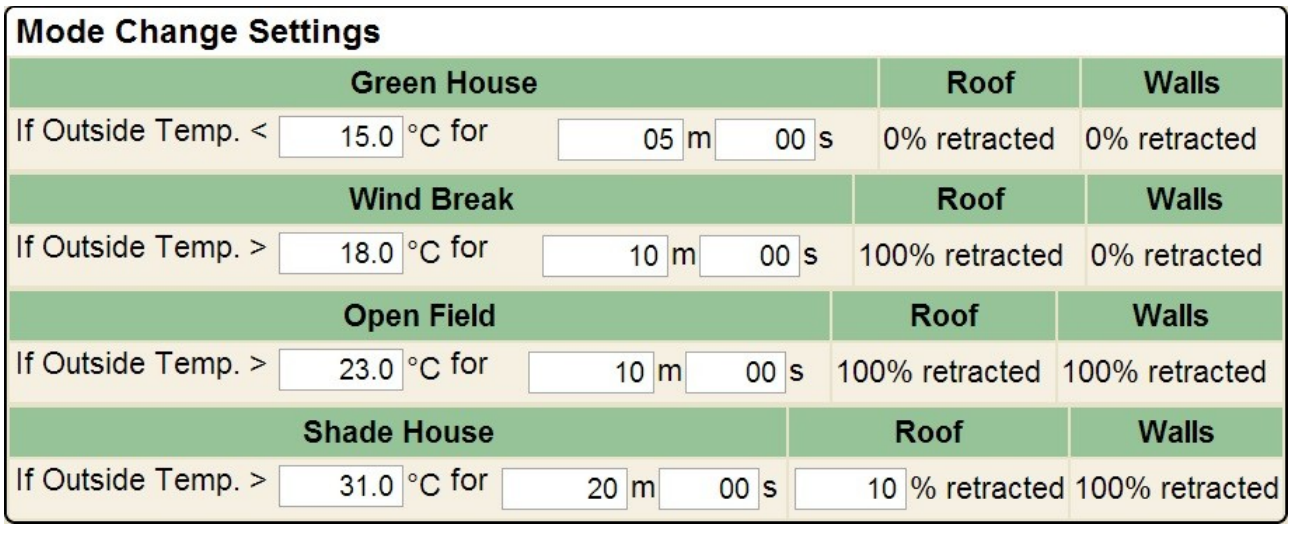
Each mode requires a separate temperature to be reached for a certain amount of time.

General



Field	Description
Mode	Current mode of the field
Desired Roof Pos	The current retracted position of the Roofs which the system is trying to achieve
Desired Walls Pos	The current wall position the system is trying to achieve
Desired Screen Pos	The current position of the screens the system is trying to achieve
Outside Temperature	Current temperature of the plate which is used for control
Deadband	The dead band stops the mode changing rapidly. If the transition between one mode and another is set for 15°C with a dead band of 0.5°C the temperature would have to rise above 15.5°C and drop below 14.5°C in order to actually effect the mode. This is used to stop the demand for a new mode constantly being set and cleared if the temperature is hovering around 15°C but fluctuating slightly above and below. Each mode of the field system is designed to expose the plant to the best outside conditions available. The temperatures and times used as defaults may need to be modified to yield great results for a specific installation and crop type

Modes



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Green House:
In this mode the field is being treated like a greenhouse in the example above the Outside Temperature needs to drop below 15degc for at least 5 minutes to enter this mode. This mean the outside temperature is too cold this will cause the roofs and walls to close trapping in whatever heat is available. During this mode the main control method is the humidity override if walls are installed which can retract the side walls in order to purge if necessary.

Wind Break:
The next level above greenhouse is the wind break mode this mode opens up the roof to expose plants to direct sunlight, but keeps the walls close to prevent wind chill. This mode will not only give the plants maximum light exposure but also CO2 and a higher transpiration rate can be achieved. In the example the outside plate need to greater then 18degC for at least 10 minutes for this mode to be entered.

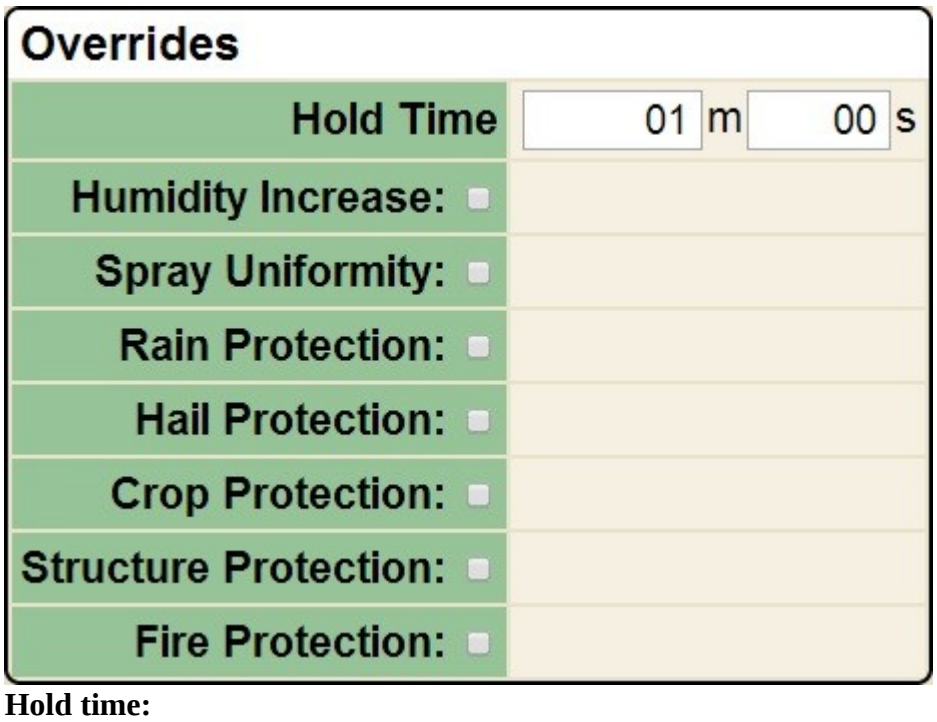
Open Field: In the open field mode the plants are essentially outside, both the roof and walls are fully retracted. This will expose the plants to maximum solar, CO2 and transpiration rates. Since the walls are fully retracted the plants are exposed to the wind directly which will strengthen stems. In the example the plate needs to be at 23degc or above for at least 10 minutes before this mode is entered.

Shade House: If the outside temperature is too hot the plate is being exposed to a lot of infra-red radiation. In order to reduce this on the plants the roof is now closed. The walls remain down so cooling effects from the wind can still occur. The roof position is settable this is to allow trapped hot air inside the structure to escape. This retracted position should be adjusted to match the tolerance of the plants under the roof.

Overrides

Overrides are secondary control methods that can come into effect if certain conditions are met. These will take precedence over the current mode and force the Roofs and Walls to a certain position.

Overrides

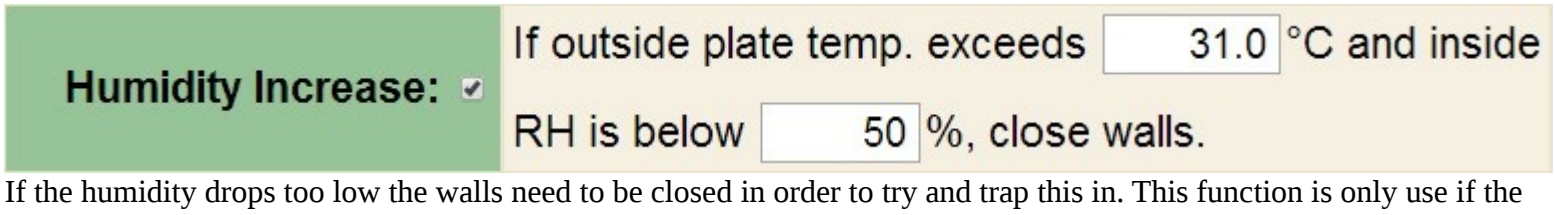


Hold time:
The hold time is the time needed for an override to finish and move into another mode, escalating overrides will not be delayed but de-escalating overrides must wait for this time before changing. This includes going from no overrides to a normal operation mode.

Holding:

If the mode is currently being held, the next desired mode and time until it can be entered will appear in this box (below hold time). If no holding is required this field is hidden.

Humidity increase:



If the humidity drops too low the walls need to be closed in order to try and trap this in. This function is only use if the temperature is above a certain level to ensure it won't end up being too cold inside the walls. The roof position will be left under the control of the normal modes.

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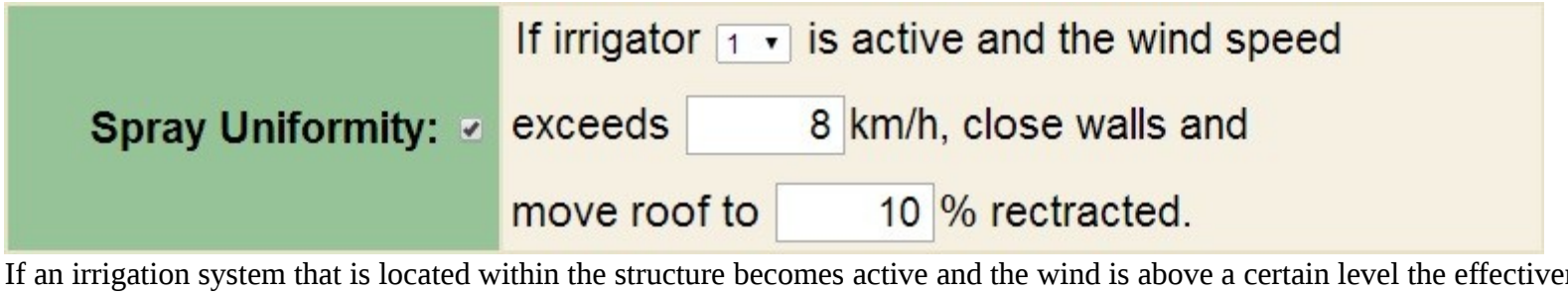
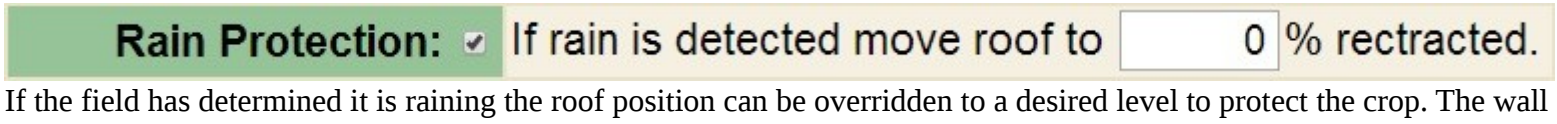
Spray Uniformity:



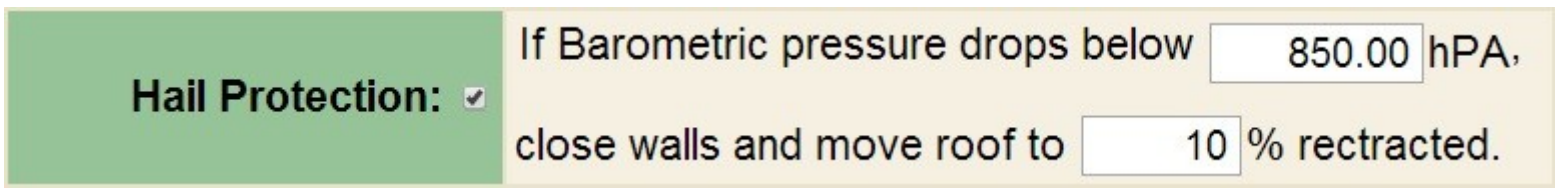
If an irrigation system that is located within the structure becomes active and the wind is above a certain level the effectiveness of the watering maybe comprised. If this occurs an override to ensure spray uniformity can be done, by closing the walls and the roof. In order to maintain better conditions inside the house the roof position can be specified during this override. Any of the 8 irrigation systems can be used as a source for this override.

Rain Protection:



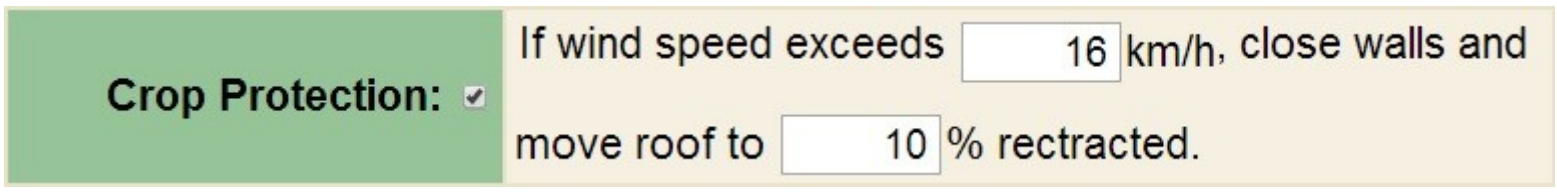
If the field has determined it is raining the roof position can be overridden to a desired level to protect the crop. The wall position will still be controlled by the normal mode.

Hail Protection:



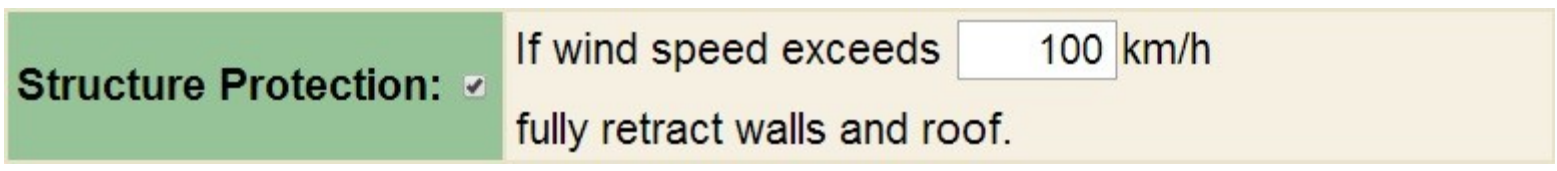
If the barometric pressure of the site drops below a certain level it is an indication of bad weather. This level will vary based on location on the planet as well as elevation above sea level. If this drop is detected the roof can be overridden to a set position and the walls will close.

Crop Protection:



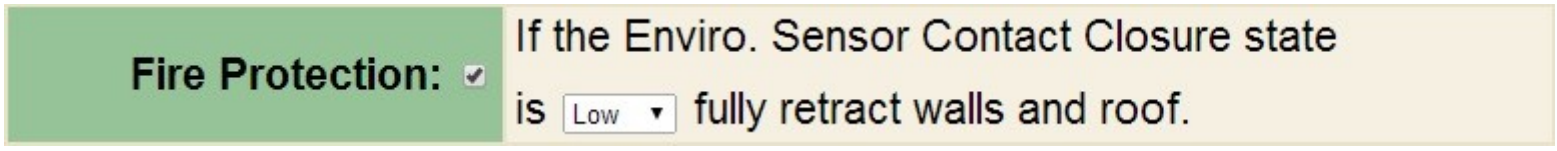
If the wind reaches a certain level it can be dangerous for the crop, the crop protection override will cause the walls to close to protect the plants. The roof position will also be overridden to a desired position.

Structure protection:



If excessively high winds are detected the safest thing to do is fully open both the walls and roofs. This wind level can be set here.

Fire protection:



A fire or smoke detecting sensor needs to connected to the ES mini and this must be installed in the field for this override to work. Depending on how this sensor is wired in it will either cause the Contact Closure state to go High or Low when a fire is detected. If this override is enabled and this condition arises both the walls and roofs will be fully retracted.

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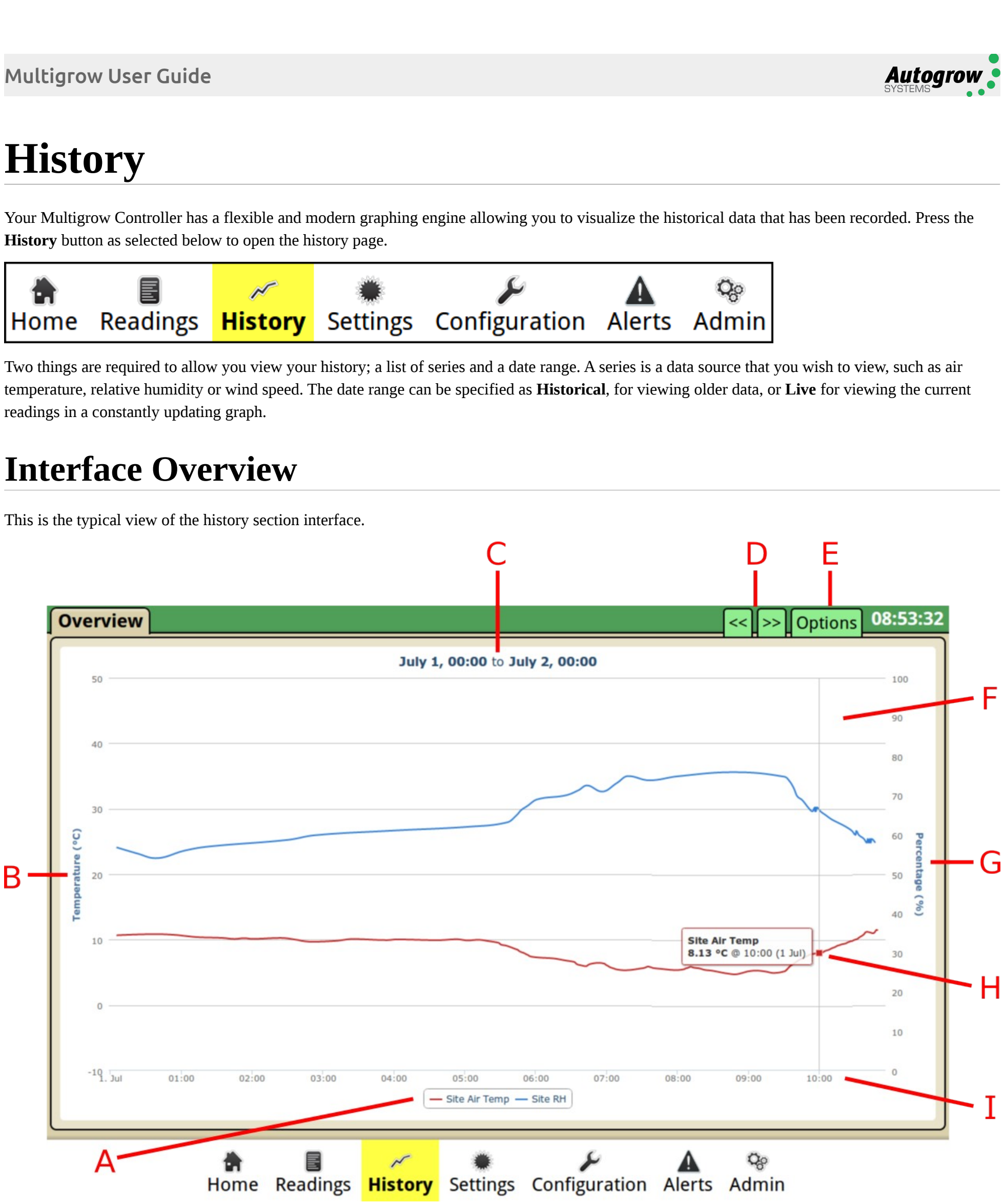
History

Your Multigrow Controller has a flexible and modern graphing engine allowing you to visualize the historical data that has been recorded. Press the **History** button as selected below to open the history page.

Two things are required to allow you view your history; a list of series and a date range. A series is a data source that you wish to view, such as air temperature, relative humidity or wind speed. The date range can be specified as **Historical**, for viewing older data, or **Live** for viewing the current readings in a constantly updating graph.

Interface Overview

This is the typical view of the history section interface.



A description of each annotation follows:

Annotation	Name	Description
A	**Legend**	The Legend shows the series that are currently displayed and allows each to be selectively hidden by clicking on them.
B	**Primary Series Axis**	The primary series axis contains the scale for one of the series. The axes for other series may be displayed on the right in the Secondary Series Axis. If two or more series use the same unit (for example °C) they will use the same axis.
C	**Graph Title**	The graph title shows the current date range of the graph.
D	**Timestep Buttons**	The Timestep buttons only appear when an historic date range is selected. They allow shifting the date range to either the future or the past by the period currently shown. For example if you are viewing a whole days data, and you click the left timestep button, the data from the previous day would be shown.
E	**History**	The Options button shows the options menu for the history. See below for a description of the History options menu.

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Annotation	Name	Description
	Options Button	
F	**Graph Area**	This is the area where the series lines are drawn. Mousing over or touching the series line will cause the Data Point Dialog to appear (see H below)
G	**Secondary Series Axis**	Up to two more series axes can be displayed on the right of the graph for a total of three axes.
H	**Data point dialog**	When mousing over or by touching a series line, a small dialog will appear that displays the series name along with the value, time and date for that data point. This is useful when there are lots of series on the graph, but not every series axis is displayed.
I	**Time Axis**	The X axis tracks the time relating to the data shown.

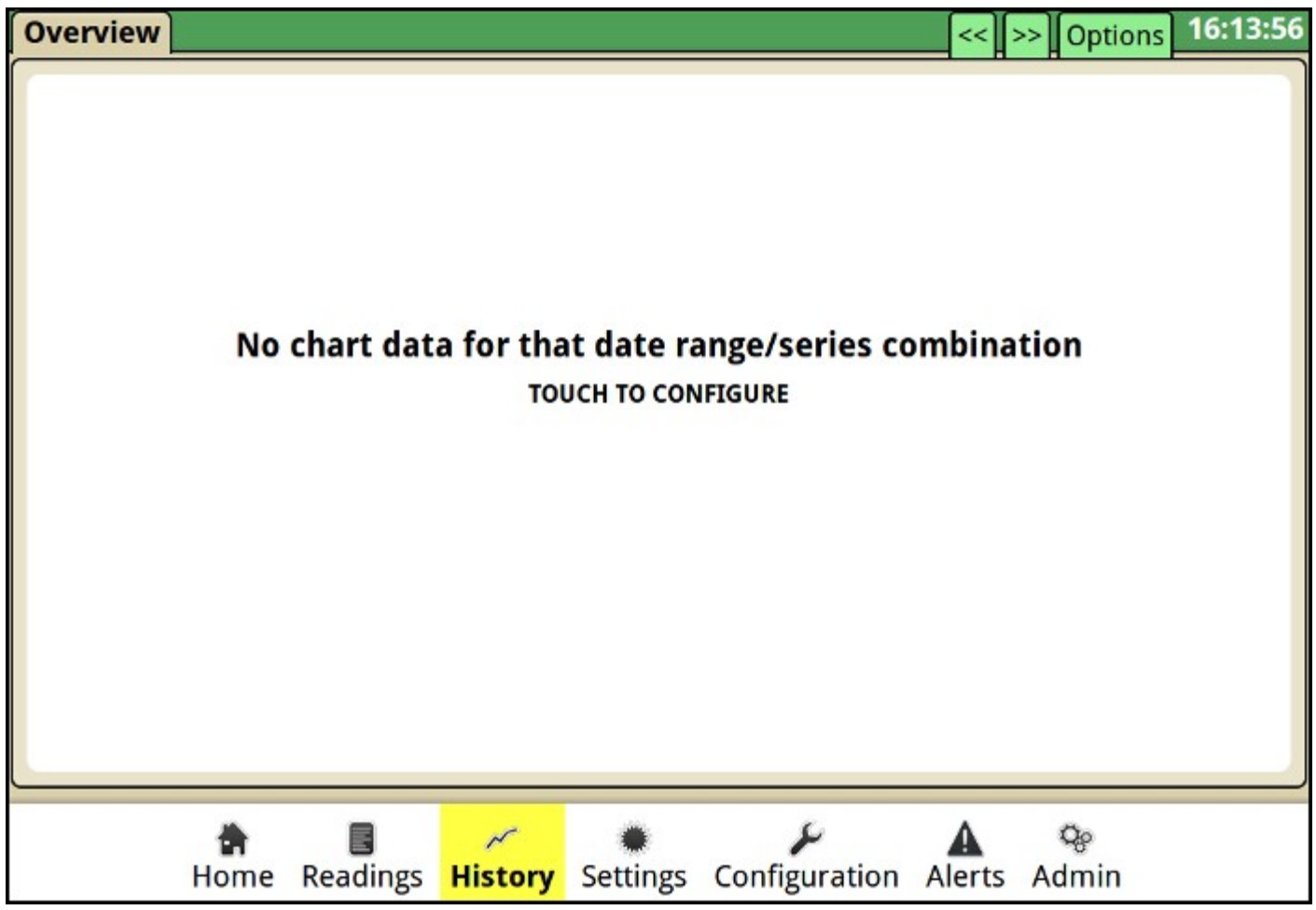
Default View

When you first open the history page, the view you see will depend on a few things.

If you have a default preset (see "**Presets**" below) then that will be loaded and you will see the series and date range from when you setup the preset.

If you have no default preset, then it will load the last 24 hours of air temperature and relative humidity data from the weather station.

If there is no data available for the given series and date range then you will see the following displayed:



If there were no series selected you will see the following message:

/uploads/history-no-series-selected.png

If there was no date range selected you will see the following message:

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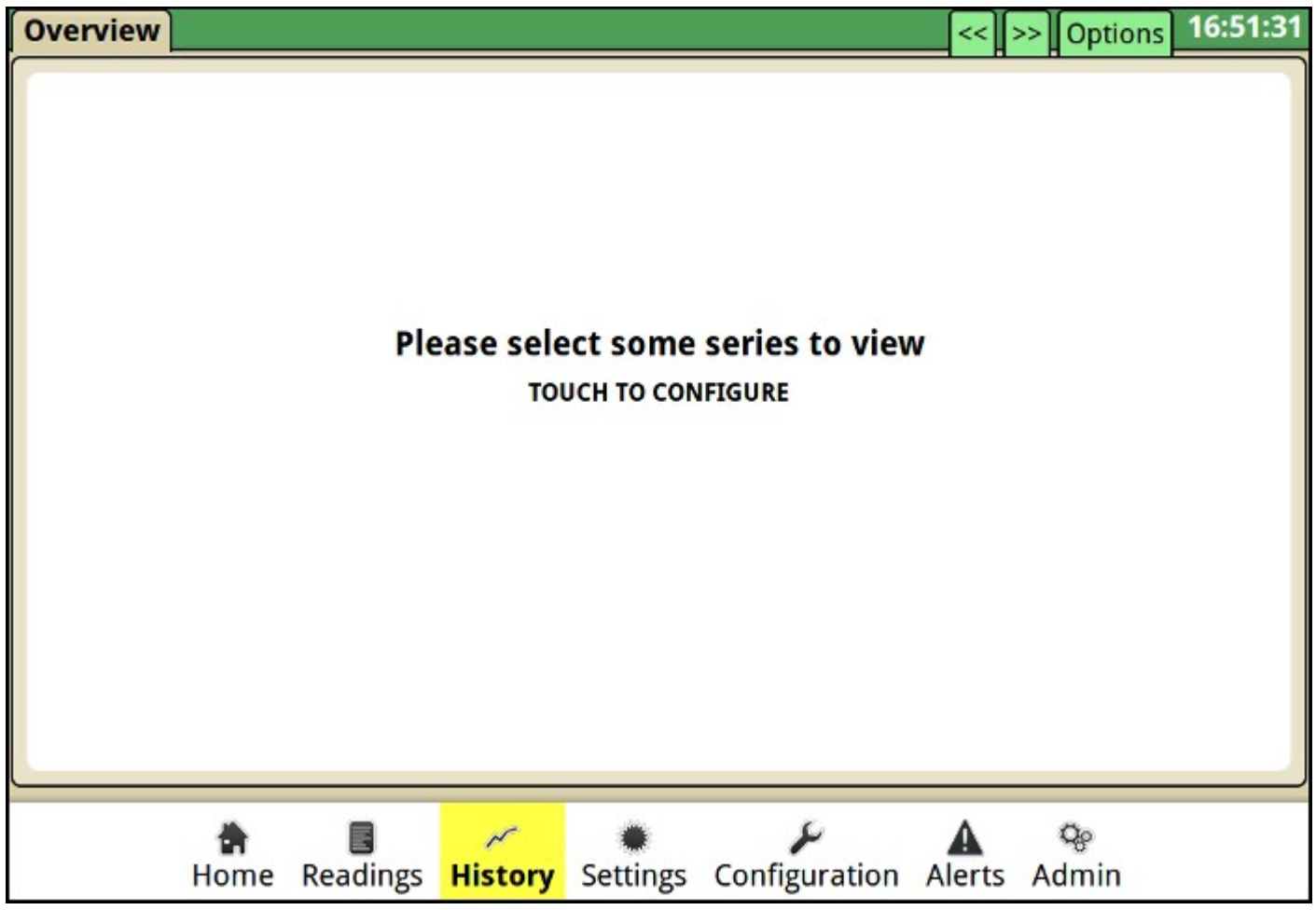
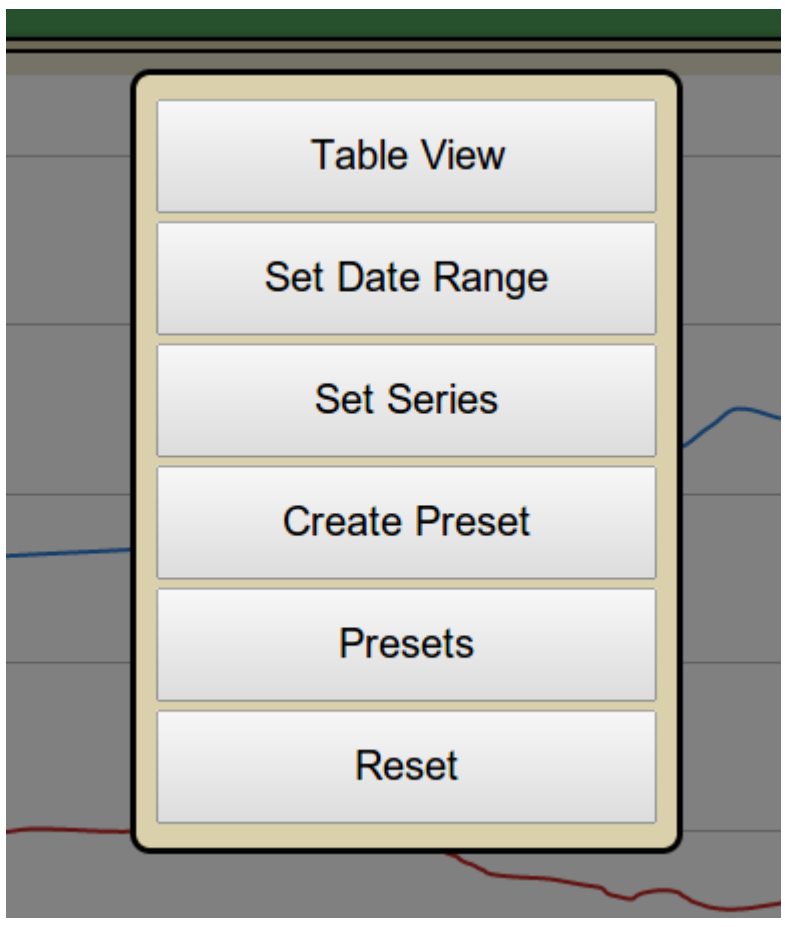


For any of the last three cases, you can

History Options Menu

The History options menu appears when you press the History Options button (E in the above annotation). From this menu you can configure the graph and choose to view tabular information.



A quick description of each button follows below, with extended information in the section titled ***History Options***.

Button	Description
Table View	Switches between table and graph view. When viewing the table this button will be called **Chart View**
Set Date Range	This button opens a dialog from which you can set the date range you wish to view. There are two methods to choose from, live or historic.
Set Series	This button opens a dialog from which you can select the series you wish to view on the graph.
Create Preset	This button allows you to create a new preset from the current graph configuration.
Presets	This button opens the Presets dialog from which you can choose the preset to display, set the default preset, or delete presets.

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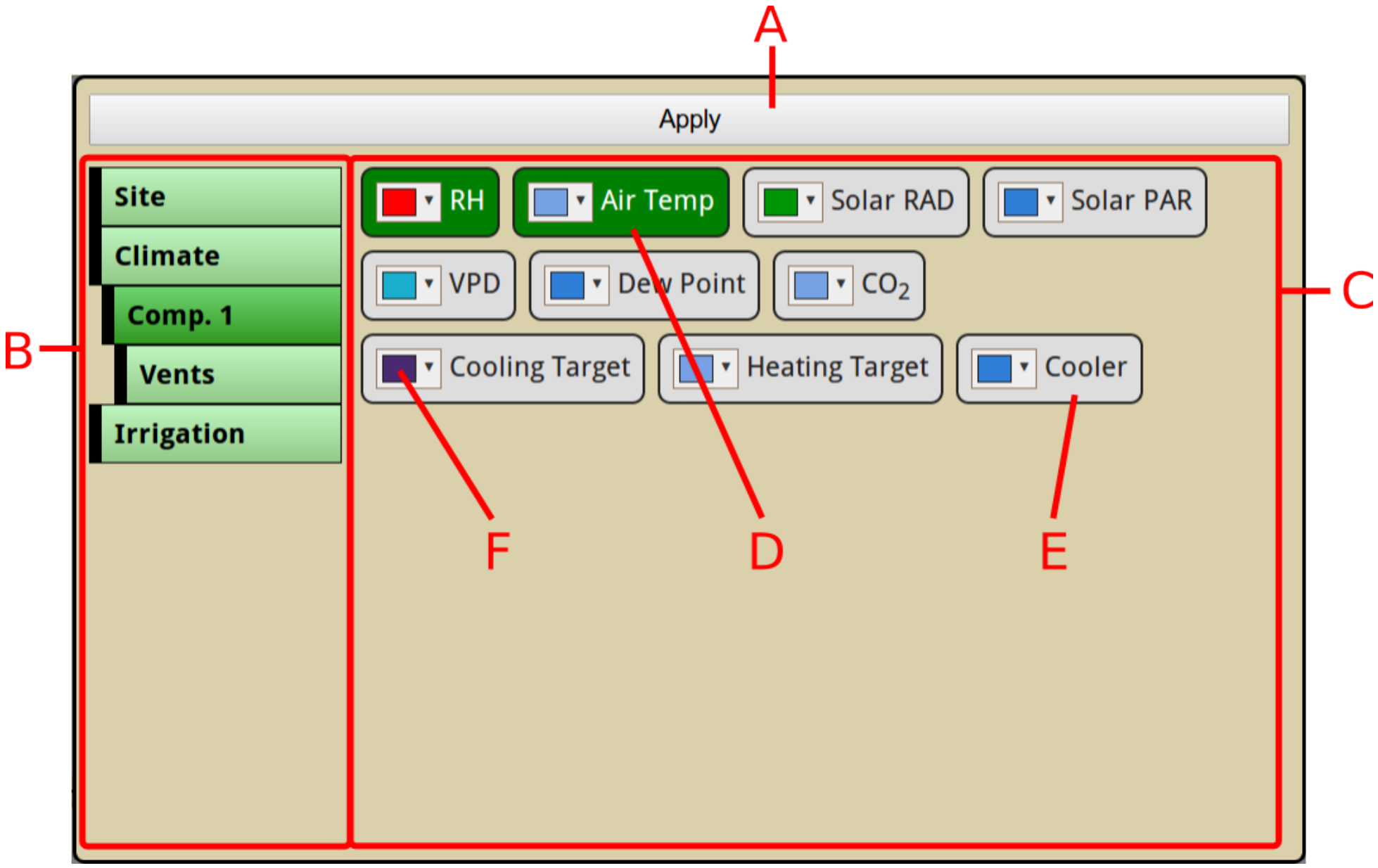
Button	Description
Reset	This button resets the chart to default values.

History Options

The graph can be configured by pressing the **Options** button at top left beside the clock, or pressing the main page when **TOUCH TO CONFIGURE** is displayed.

Selecting Series

To select the series you wish to view, open the History Options Menu and click on the **Set Series** button. This will open another dialog that shows all the series available for graphing. You can toggle a series to be shown on the graph by pressing on it, thereby changing the button colour from grey to green. See the below image for a detailed description of the series dialog.



Annotation	Name	Description
A	**Apply Button**	Applies the current series and loads the graph with the information if a date range is already provided
B	**System Selection Tree**	This is where the available systems are displayed. Pressing on these buttons here will change the series displayed in the **Series Selection Area**, and show any available subsystems
C	**Series Selection Area**	This is where individual series buttons are displayed. Pressing a series button will toggle it on or off to enable or disable it in the graph
D	**Toggled Series**	This series is toggled so it will appear on the graph
E	**Untoggled Series**	This series is not toggled so it will not appear on the graph
F	**Series Color**	This box shows what colour the line on the graph will be for this series, pressing it will allow choosing a different colour

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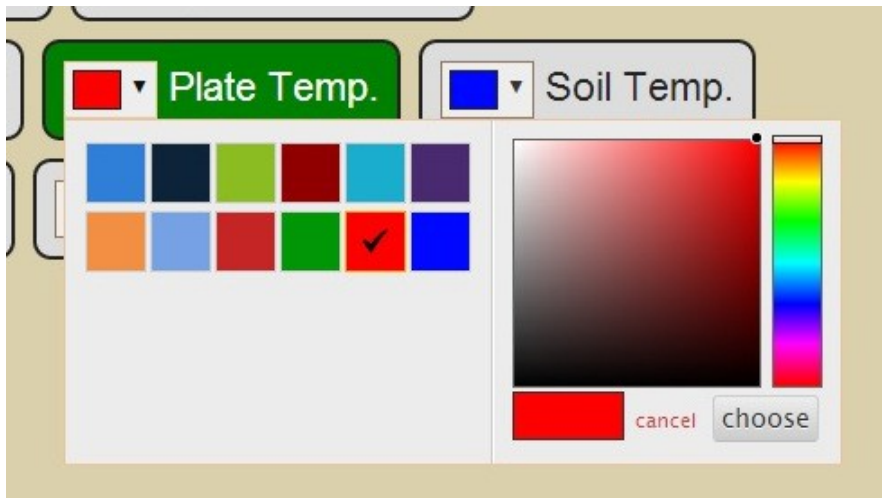
Setting Series Colour

You will see that each series in the series dialog has a coloured box beside it. This determines the colours of the series lines that are drawn on the graph. Clicking on one of these colour boxes allows you to change the color of the series.

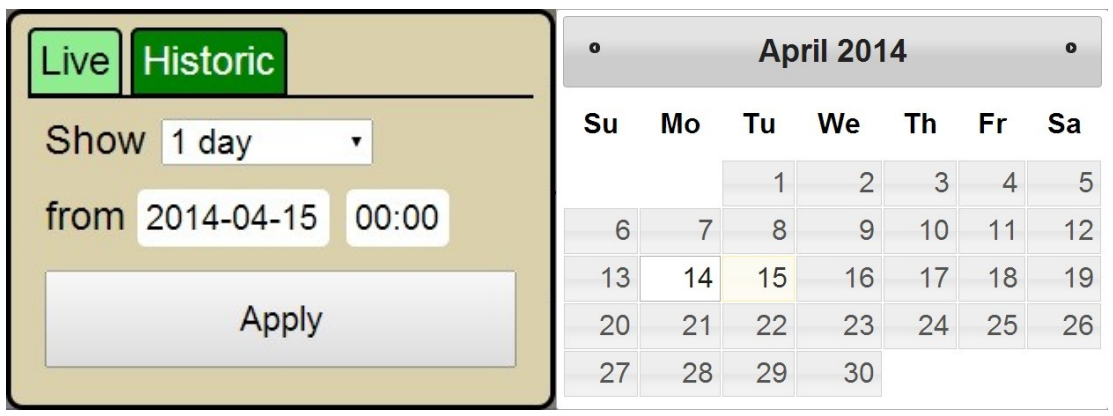


Selecting Date Range

You can select the date range to show on the graph by pressing the **Options** button and then pressing the **Set Date Range** button. This will open a new dialog with tabs at the top for choosing between **Live** and **Historic** data.

Historic

The historic date range allows you to view data from the past. When choosing the **Historic** tab the following dialog will appear.



This dialog allows you to accurately specify the amount of data you wish to view, up to a month at a time. This is done by specifying how much data to view with the **Show** dropdown box, and from what date and time. Pressing in the date field will open the calendar shown above.

Live

The live date range allows you to view up to the last three days of data. In live mode the graph will automatically update every minute with the latest readings on the right side of the graph, with the oldest readings sliding off the graph to the left.

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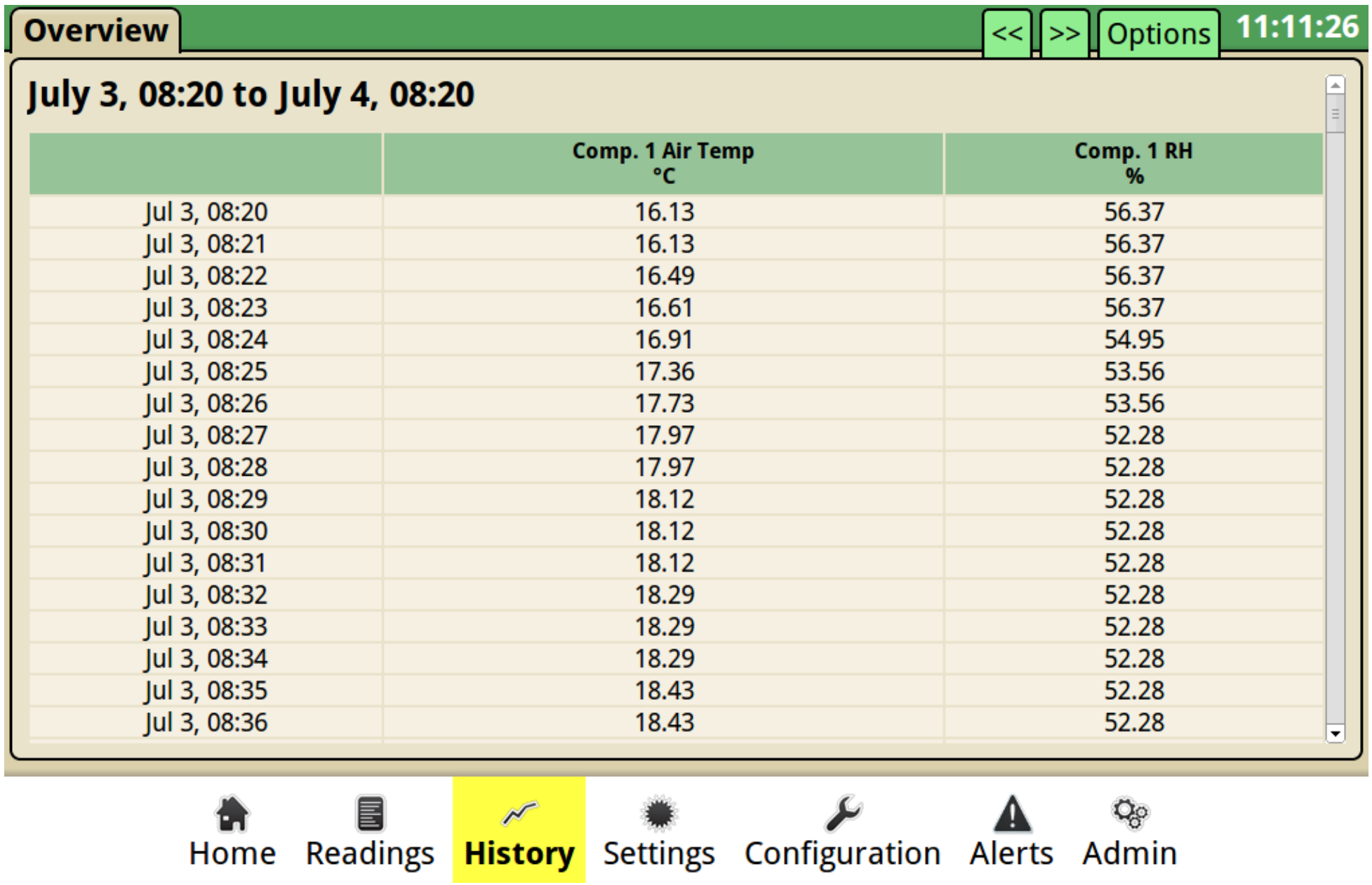
Table View

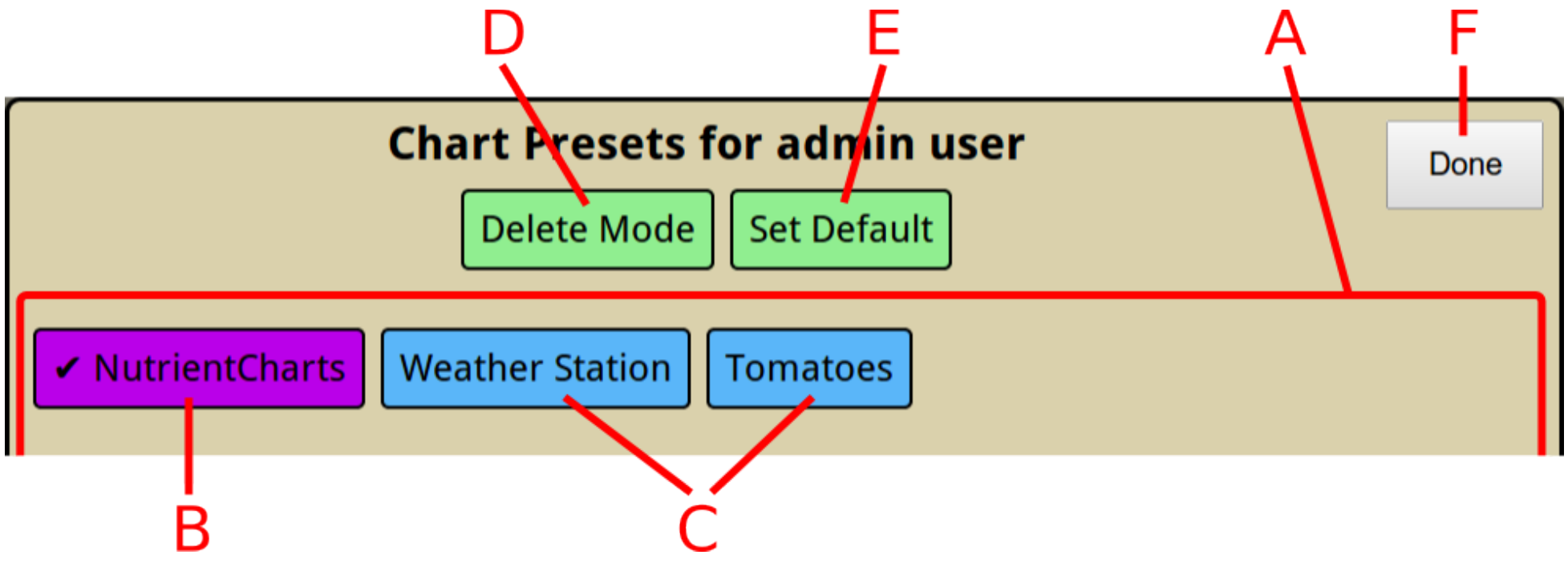
You are able to view the graph information in tabular form by opening the **History Options Dialog** and pressing the **Table View** button. This will present a table view of the series in the date range selected, at a consistent interval (every 1 minute).



While in the table view you can still select the series and date range as you would in the graph view, and have them applied to the table. Also, if you open the **History Options Dialog** while in the table view you will see that the **Table View** button has changed to **Chart View**. You can click this button to go back to the graph view.

Presets

Presets allow you to save frequently used graph settings to be reused. You can also set a preset to be loaded by default when you first open the History page.



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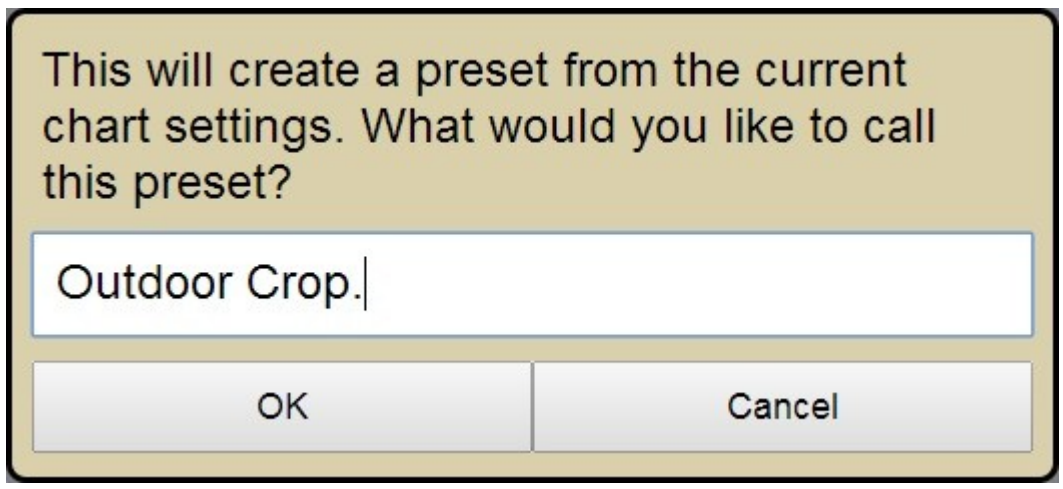
Annotation	Name	Description
A	**Presets Area**	This is where all the preset buttons are located
B	**Default Preset Button**	This preset will be loaded when you go to the History Page, pressing it will load it
C	**Preset Button**	Pressing one of these will load the graph with the preset
D	**Delete Mode Button**	Pressing this button will enable delete mode, allowing you to delete presets by pressing the corresponding button
E	**Set Default Button**	Pressing this button will enable set default mode, allowing you to set the default preset by pressing a preset button
F	**Done Button**	Closes the **Presets Dialog**

Creating a preset

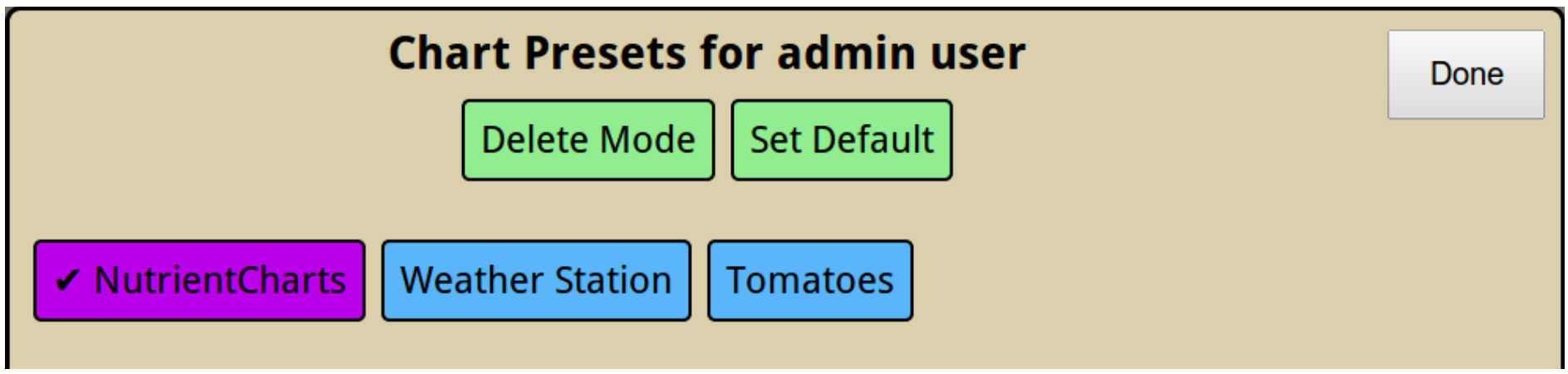
To create a preset, select the series and date range you want for the preset. Then on the **History Options Dialog** press the **Create Preset** button.



Enter the name of the preset in the text field and press the **OK** button. Your new preset will now appear in the **Presets Dialog**.

Loading a preset

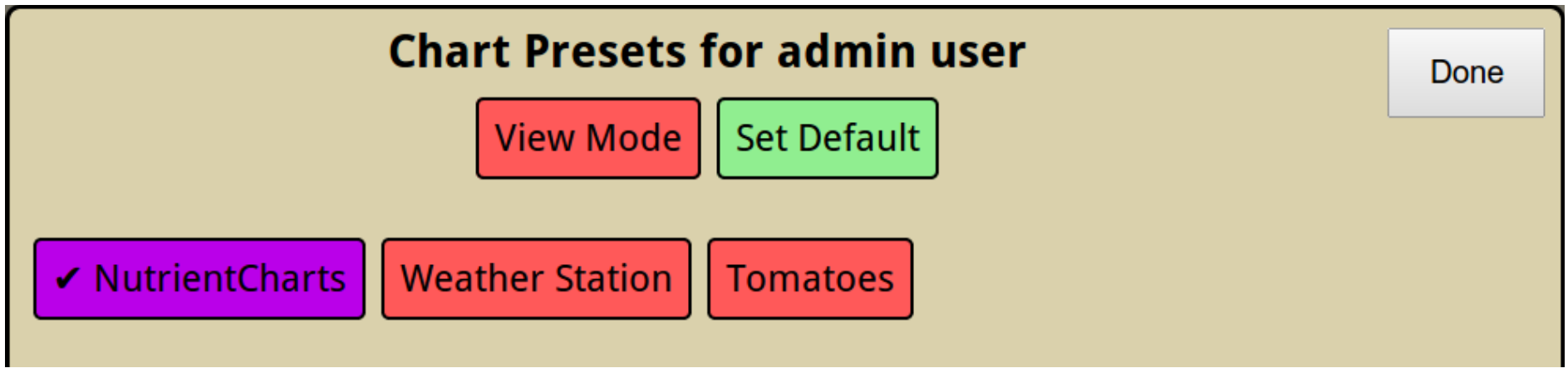
To load a preset, open the **History Options Dialog** and press the **Presets** button. This will open the **Presets Dialog** which will display the available presets and various buttons for manipulating presets.



Pressing any of the blue buttons will load that preset. The default preset is denoted by a purple colour and tick before the name and can also be loaded by pressing it.

Deleting a preset

To delete a preset you will need to press the **Delete Mode** button to enter deletion mode. This will turn all the preset buttons red to indicate they will be deleted by pressing them. The **Delete Mode** button will also turn red to indicate that delete mode is active. Pressing a preset in this mode will prompt you to confirm that you want to delete the preset. Pressing the **OK** button on this prompt will delete the preset.



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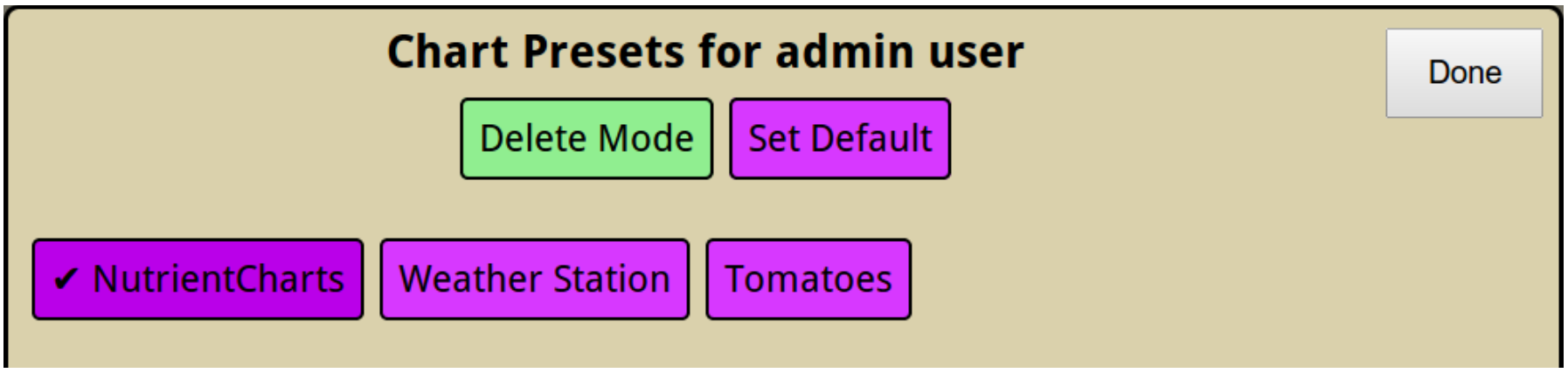
To exit the deletion mode, press the **Delete Mode** button again. It will return to the original green colour, and all the preset buttons will return to their blue colour.

Setting a default preset

Setting a preset as the default preset will cause it to be loaded whenever you go to the History page. To set or change the default preset, open the **History Options Dialog** and press the **Presets** button to load the **Presets Dialog**. Press the **Set Default** button to enable default mode. The **Set Default** button will turn purple as well as all the preset buttons.



Press the button for the preset that you want to make the default preset. A tick will appear next to the preset name to indicate it has been set as default (and disappear from the previous default - if one was set).

If you change the series/date range then those settings - not the default preset - will be loaded into the graph when you go to the History page. If you want the default preset to load again simply press the **Reset Chart** button in the **History Options Dialog** or on the loading screen.

Changing the X axis scale

It is possible to change the X axis scale for each unit of measurement that can be displayed. The min and max scale can be adjusted to ensure the best data resolution is displayed on the graph.

Chart Scales (min - max)		
Flow Rate	0	1000
Nutrient	0	10
pH	0	14
Temp:	-10	50
RH	0	100
Solar RAD	0	1000
Solar PAR	0	2000
VPD	0	3
Wind Speed	0	100
Baropressure	950	1100
Water Volume	0	1000
Rainfall	0	50

In the case of barometric pressure it would be silly to show the scale from 0 on the X-axis because the lowest ever recorded barometric pressure was 870mbar inside the eye of cyclone. If you find that your chart scales are too narrow and causing the the series lines to go off the graph you can widen them to bring the lines back onto the graph.

Configuration

Most Multigrow systems use a weather station to help with controlling temperatures. Knowing what the outside environment readings are help a lot with cooling and heating control among other features. Weather stations can be shared among multiple Multigrow controllers.

You can configure a weather station by going to **Configuration > Overview** and ticking the checkbox labelled **Weather** underneath the **General** heading. Pushing the **Save** button that appears should refresh the page and you will notice a new tab in the Primary Menu labelled **Weather**. Push this tab, or navigate to **Configuration > Weather**.

Push the **Add new** button if there are no sensors in the table and enter the weather station address in the field beside the delete button. Push the **Save** button that appears and then hit **Activate** on the Configuration Bar. Once the configuration is processed you should see a weather station entry like this:

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Weather Stations

Sensors	Device Info.							
0 X		Error	RS485 Master	Plate Heater On	Wand Sensor Type	Serial Number	Firmware Version	PCB Version
⊕ Add new	WS 1	0	Yes	No	Sensirion	14060017	3.00	2.02

Settings

Navigating to **Settings** > **Weather** > **Sensors** will show some summaries of the weather station readings. If there are multiple weather stations then these readings will be averaged across the weather stations, with certain fields from individual weather stations.

Air	
Air Temp	21.2°C
RH	47%
Dew Point	9.4°C
VPD	1.329kPa

Rain	
Raining	No
Rain Freq.	44371Hz
Trip Freq.	35000 Hz
Rain Fall Since Midnight	
Tipping Bucket	0.0mm
State	1

Solar	
Solar RAD	0W/m²
Solar PAR	21µmol/m²/s
Accum. Solar	0.0J/cm²

Gust	
Gust Speed	0km/h
Gust Direction	1° N
Accum. Wind	0m

Select Heading for calibration. Tick box to add to average / use reading

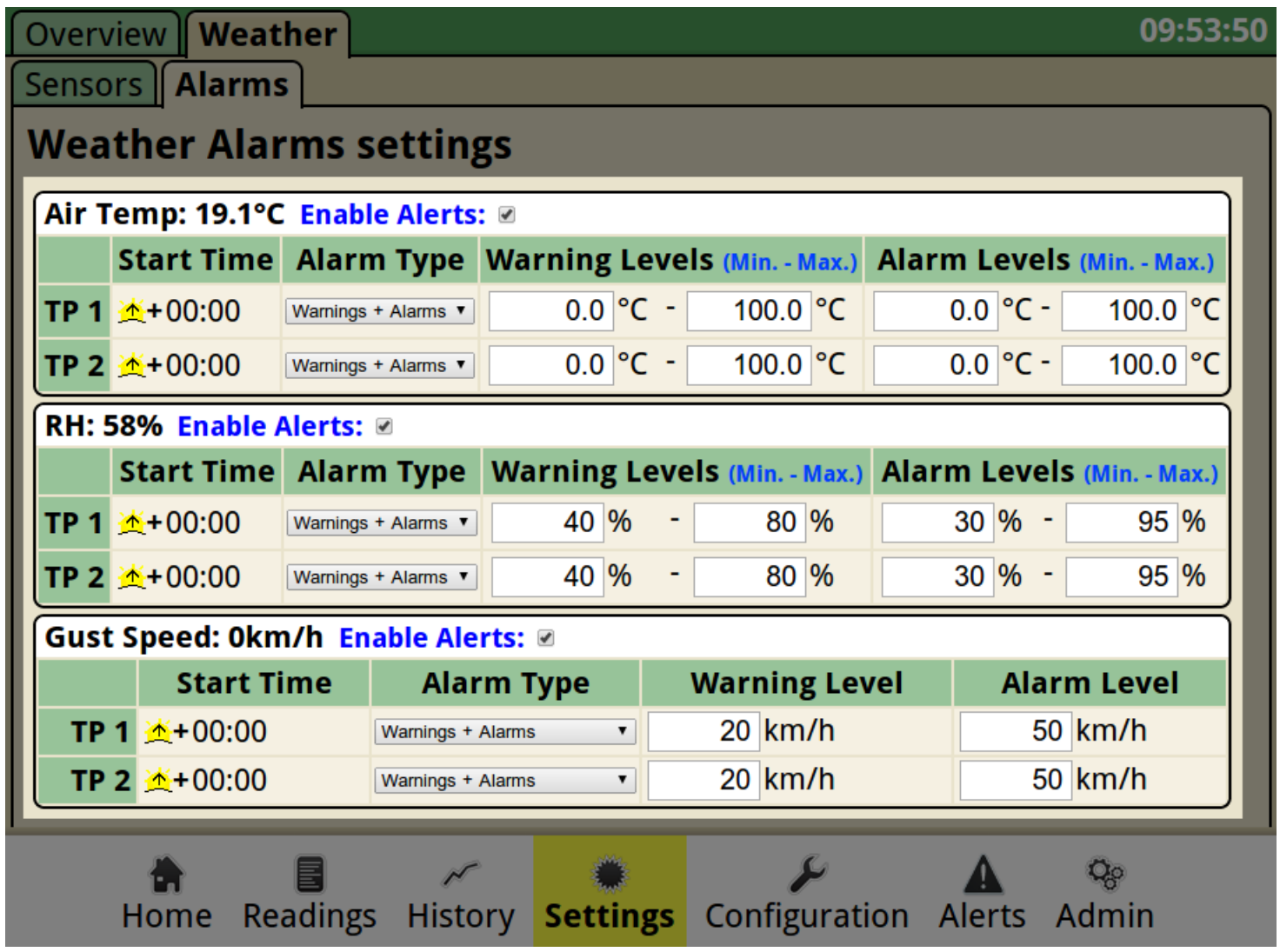
	Air Temp. (Ave)	RH (Ave)	Solar RAD (Ave)	Solar PAR (Ave)	Rain Fall (Ave)	Rain Freq (Use)	Tip State (Use)
WS 1	21.2°C ☑	47% ☑	0W/m² ☑	20µmol/m²/s ☑	0.0mm ☑	44371Hz ☑	1 ☑

When you have multiple weather stations, you can choose to average the readings across weather stations by ticking the checkbox beside each weather station reading.

Rain Freq and **Tip State** should not be averaged however so the checkbox being ticked indicates you want to use the reading from that particular weather station. If the Use checkbox is ticked on two weather stations, then the reading from the *lowest addressed* weather station (i.e. 0 over 1) will be used.

You can also setup alerts for when the weather station values go out of range by navigating to **Settings** > **Weather** > **Alerts**.

For weather alerts you can set limits for air temperature, relative humidity and wind gust speed:


Overview
Weather
09:53:50
Sensors
Alarms
Weather Alarms settings
Air Temp: 19.1°C Enable Alerts:
Start Time
Alarm Type
Warning Levels (Min. - Max.)
Alarm Levels (Min. - Max.)
TP 1 +00:00 Warnings + Alarms 0.0 °C - 100.0 °C 0.0 °C - 100.0 °C
TP 2 +00:00 Warnings + Alarms 0.0 °C - 100.0 °C 0.0 °C - 100.0 °C
RH: 58% Enable Alerts:
TP 1 +00:00 Warnings + Alarms 40 % - 80 % 30 % - 95 %
TP 2 +00:00 Warnings + Alarms 40 % - 80 % 30 % - 95 %
Gust Speed: 0km/h Enable Alerts:
Start Time
Alarm Type
Warning Level
Alarm Level
TP 1 +00:00 Warnings + Alarms 20 km/h 50 km/h
TP 2 +00:00 Warnings + Alarms 20 km/h 50 km/h
Home
Readings
History
Settings
Configuration
Alerts
Admin

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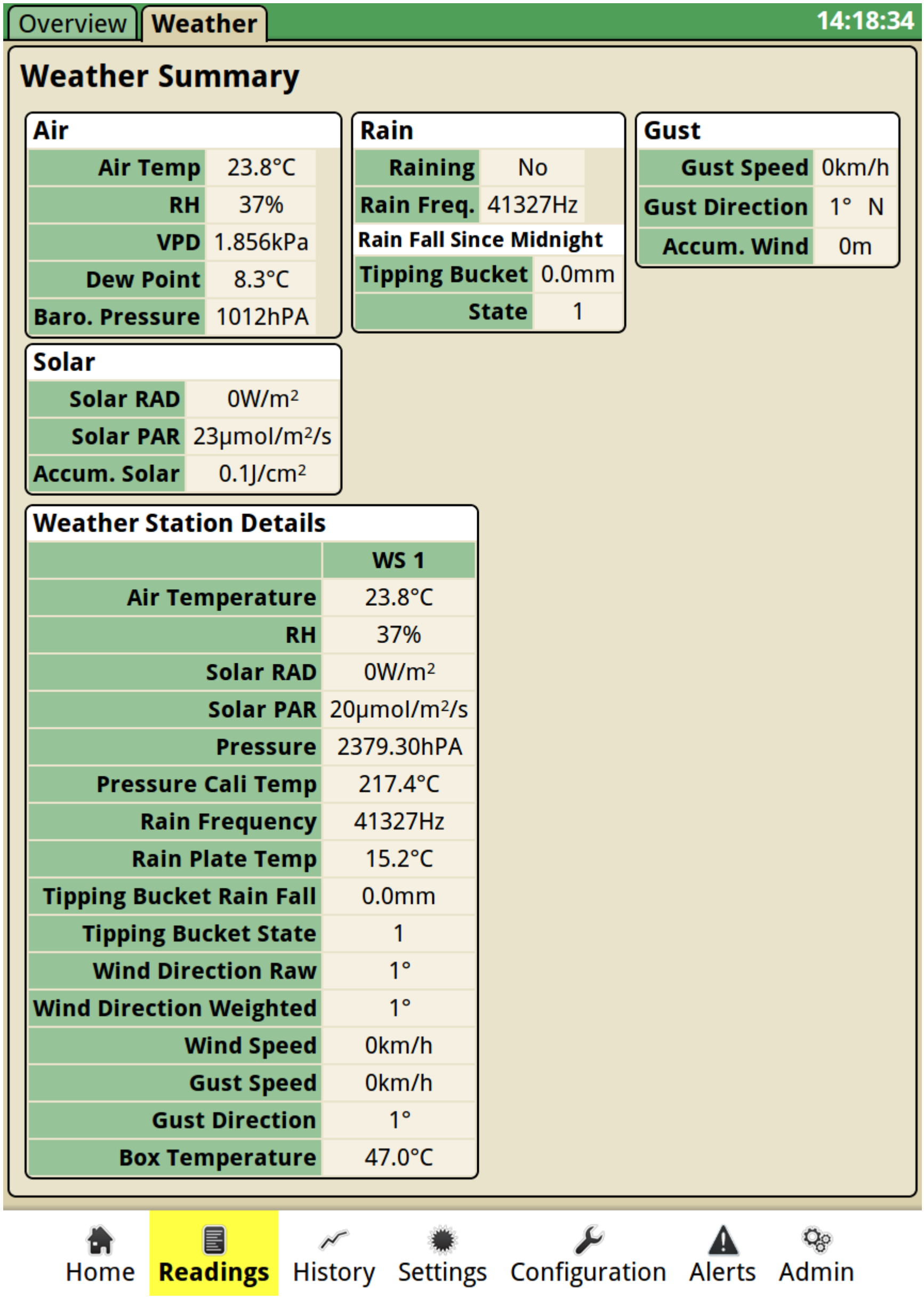
Readings

By navigating to **Readings > Weather** you can see all the readings for your weather station. This page is pretty self-explanatory:



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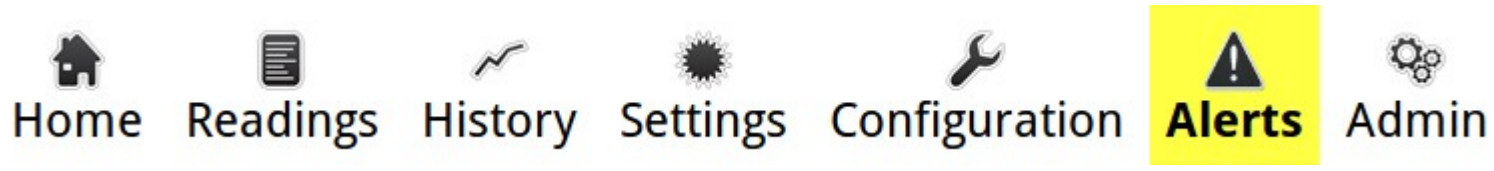
Alerts

The Multigrow will raise alerts when certain events happen to let you know of any potential issues. If you have a subscription to the **Device Management System** then you will also receive alerts via SMS and email.



Alert types

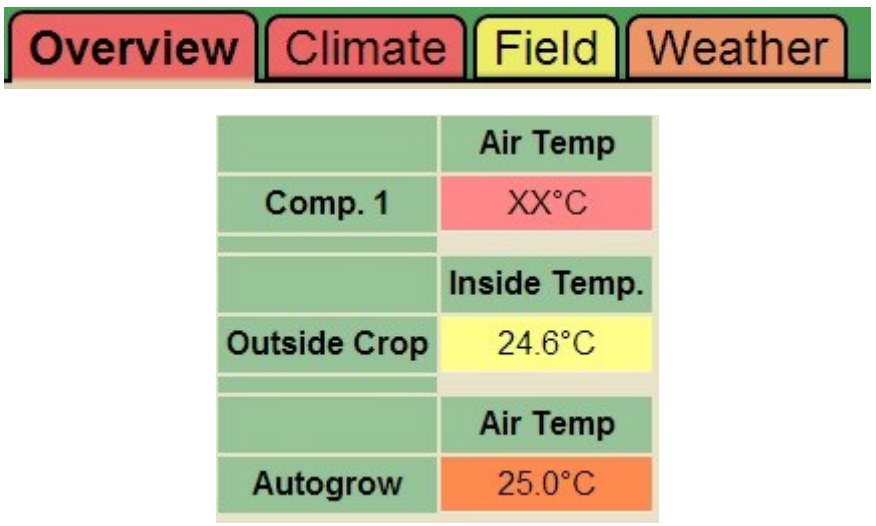
There are three types of alerts that will be raised, in order of worsening severity:

- **Warning** - the colour yellow, this alert level is to warn you that something is about to become a problem and needs to be investigated
- **Alarm** - the colour orange, this level tells you of a damaging situation that requires urgent attention
- **Error** - the colour red, this alert level is specific to problems with peripherals (e.g. invalid readings or blown fuses)

How to tell if you have active alerts

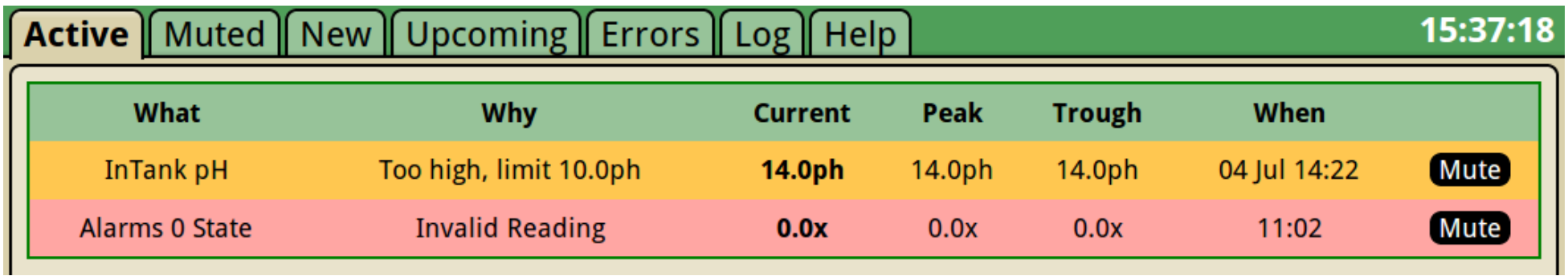
You can instantly see if any alerts are currently active by looking at the **Home** section. The button in the middle will show **All OK** if there are no active alerts. Otherwise it will give you a summarized report with the count of the different types of alerts.

You can tell where the alerts are by looking at the Readings section. The tabs and fields will change colour depending on the type of alert:



Active

The **Active** tab shows alerts that are currently active.



From this page you can see the current reading known by the alert, along with the highest reading (**Peak**) and lowest reading (**Trough**) seen so far. There is also a **Mute** button that opens a dialog from which you can silence an alert for a specified amount of time.

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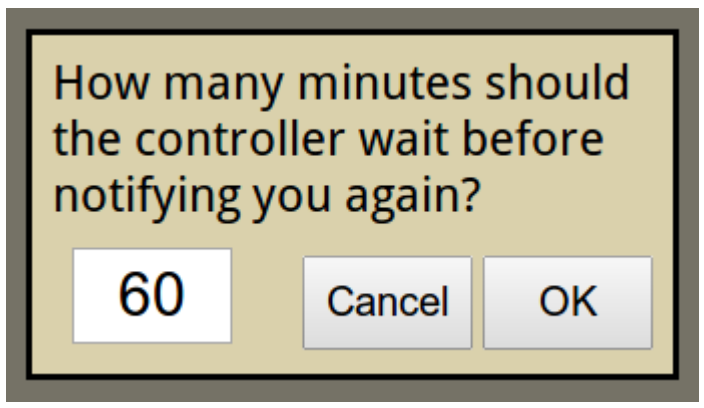
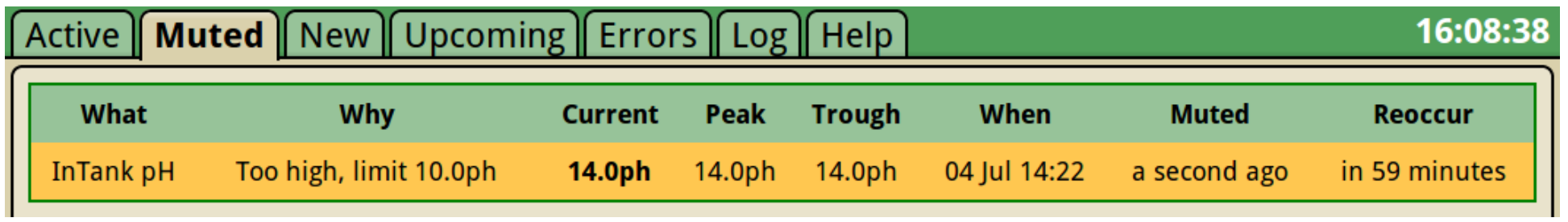


This is so that if you see an alert, and you have rectified the cause, you can silence it for 30 minutes. If the alert is still active in 30 minutes you will be alerted again, and if not the alert will silently go away when the reading have come back into range.

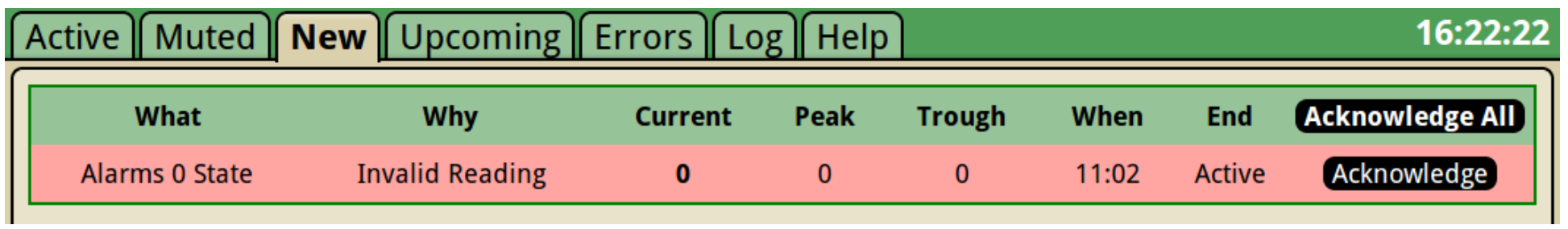
Muted

The **Muted** tab shows all alerts which are currently muted, when they were muted, and when they are due to reoccur.



New

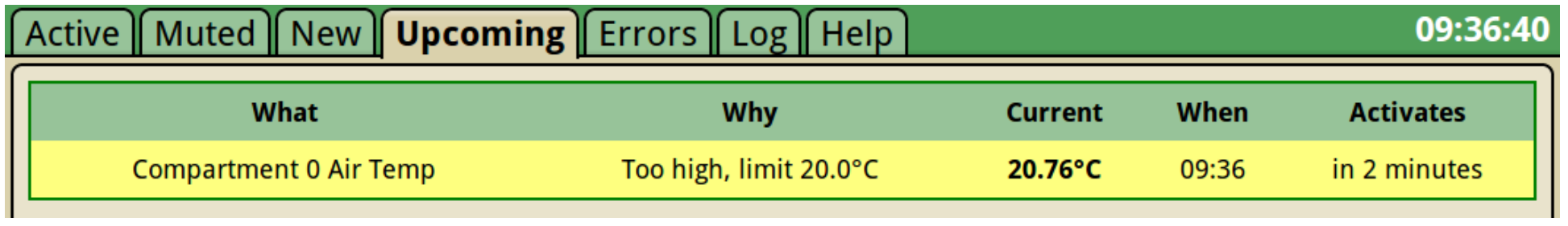
The **New** tab shows all alerts that have been raised in the last three days that haven't been acknowledged along with the time the alert was raised and the time it came back into range. The purpose of this page is keep track of alerts that may have occurred when no one was present. For instance if all alerts were acknowledged at the end of the day, then any alerts that occurred during the night but didn't stay active will can be seen at a glance.



Pushing the **Acknowledge** button causes a single alert to be removed from the new page and put into the main log. Pushing **Acknowledge All** does the same to all new alerts.

Upcoming

The **Upcoming** tab shows alerts that have been raised but are yet to pass the holdoff period. The table shows when the alert was raised, and how long before it becomes an active alert. Once it becomes an active alert it will disappear from the **Upcoming** page and appear in the **Active** page.



Errors

Under the **Errors** tab appear Error alerts. Sometimes during a system update error alerts will be generated while the system is starting up with the new ruleset. They can be deleted easily from this page.

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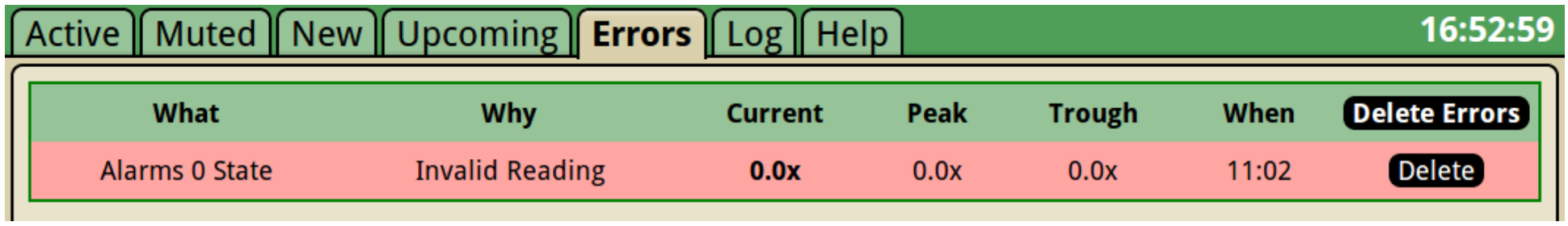
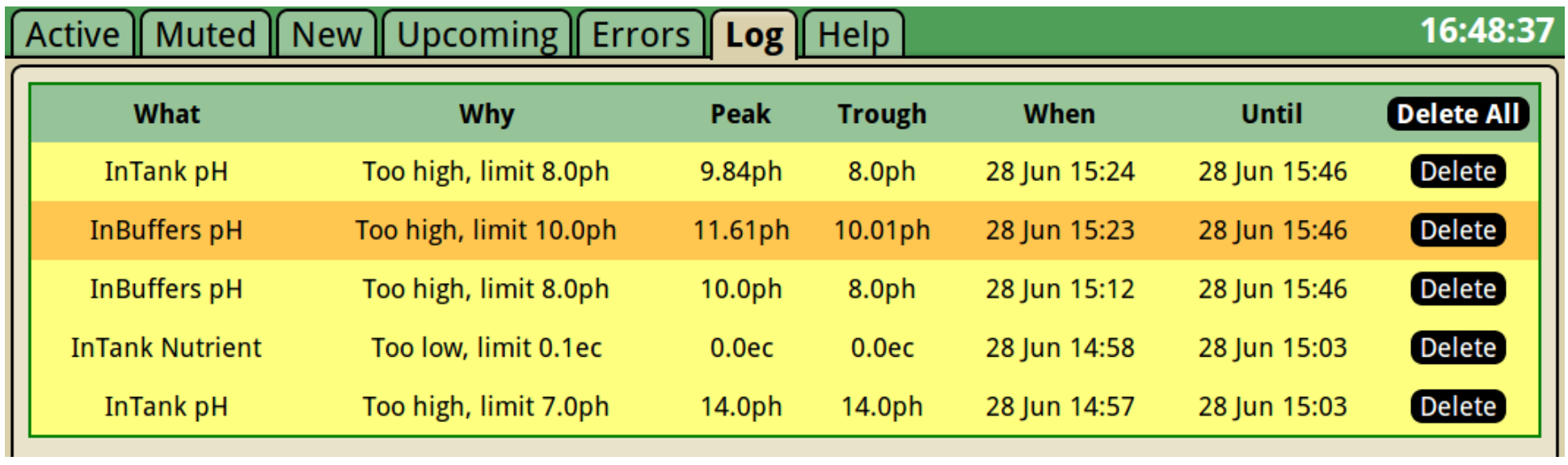


Log

The **Log** tab allows you to see all the alerts that have been raised in the past month. It is possible to delete the log manually but alerts will disappear from the log when they are more than a month old.



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Troubleshooting

Communications

No devices are communicating and there is no USB or ethernet

This could be an issue with the 5V power on the MultiUSB board. This can be easily diagnosed by checking the MultiUSB board near the Ethernet plug for a switch labeled **5V0 Pwr** as indicted in the picture below:

There are three LEDs below this switch, all of which should be illuminated. If the LED labeled **12V0** is the only one illuminated, try switching the **5V0 Pwr** switch to see if the other two LEDs come on. If they do, this should resolve the issues, however the Multigrow Controller might need to be rebooted in order to receive communications again.

Checking the communications

If you navigate to **Configuration > Overview**, at the bottom of the page you will see a checkbox labelled Display Debug. Tick it and push the **Save** button that appears. A new tab will appear in the Primary Menu called **Debug**.

Pressing this tab will show the following page:

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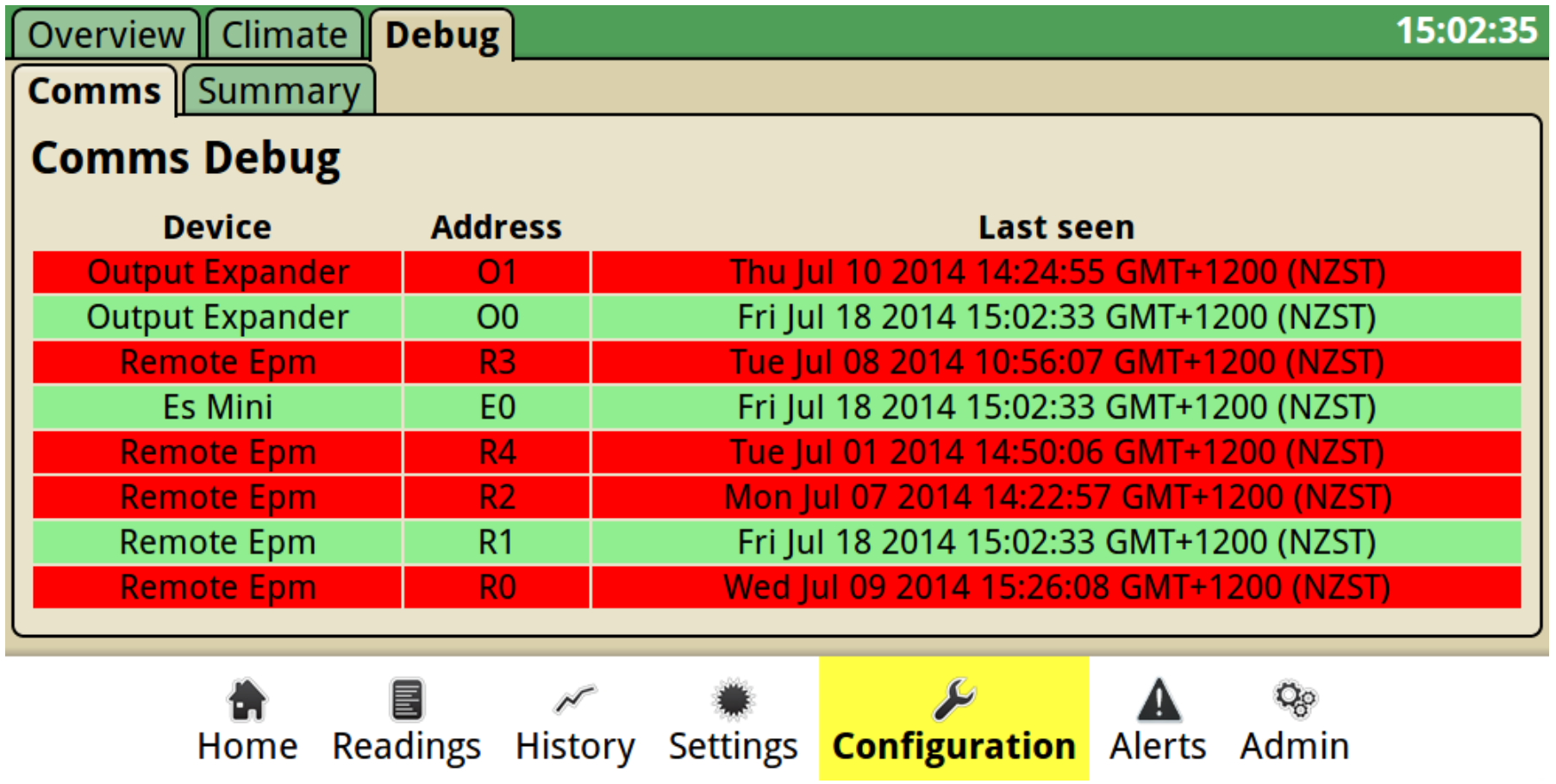

The green rows in the table show devices which are communicating fine. The red rows show devices which are not. The time under the **Last Seen** column will update whenever the device is found to be communicating fine.

Network

Check that the Multigrow is physically connected to the Network

The Multigrow should be plugged into the network. An example is shown below for connecting the Multigrow to a home router/modem.

Check the link lights on the Multigrow

In the following picuture, the ethernet cable from the network should be plugged into the socket labelled **A**. Then a cable (which comes installed in the Multigrow cabinet) runs from the socket labelled **Z** to the Multigrow control Unit.

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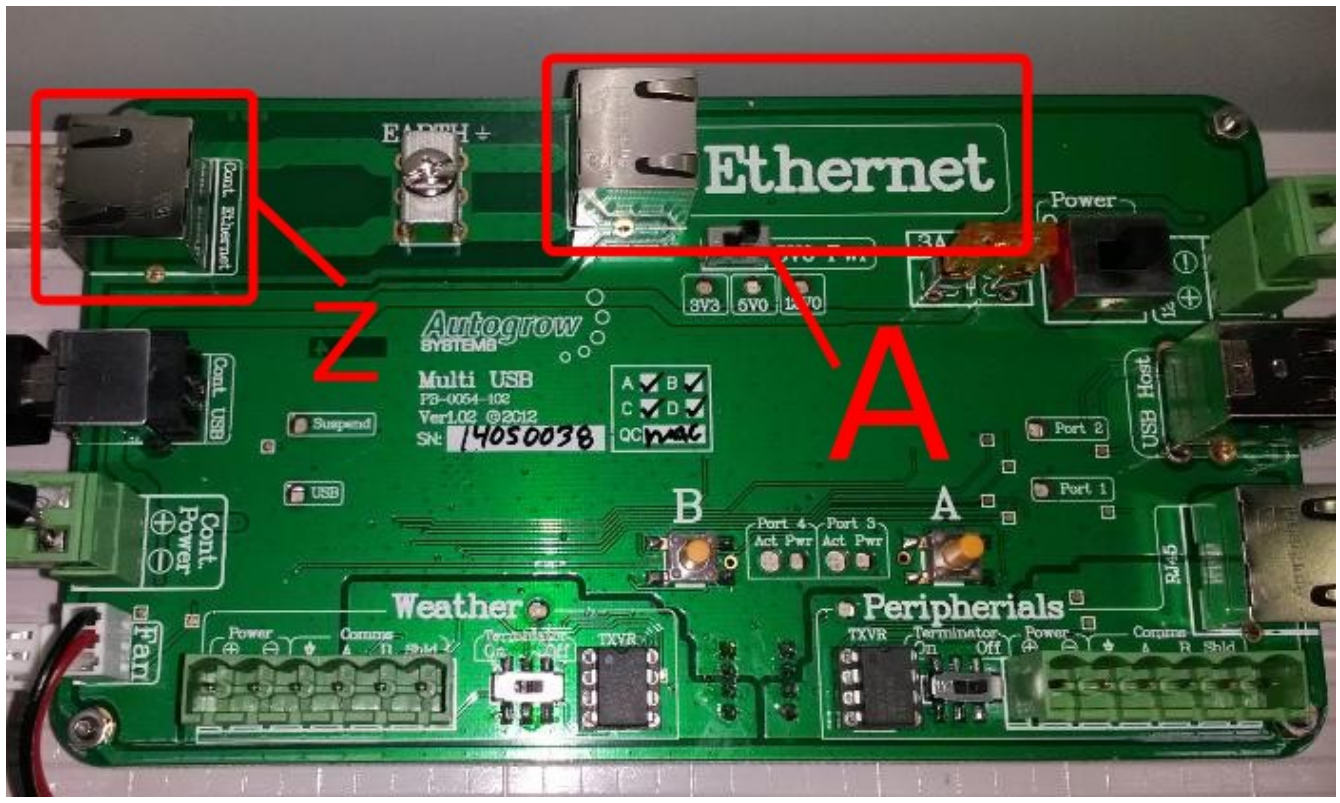
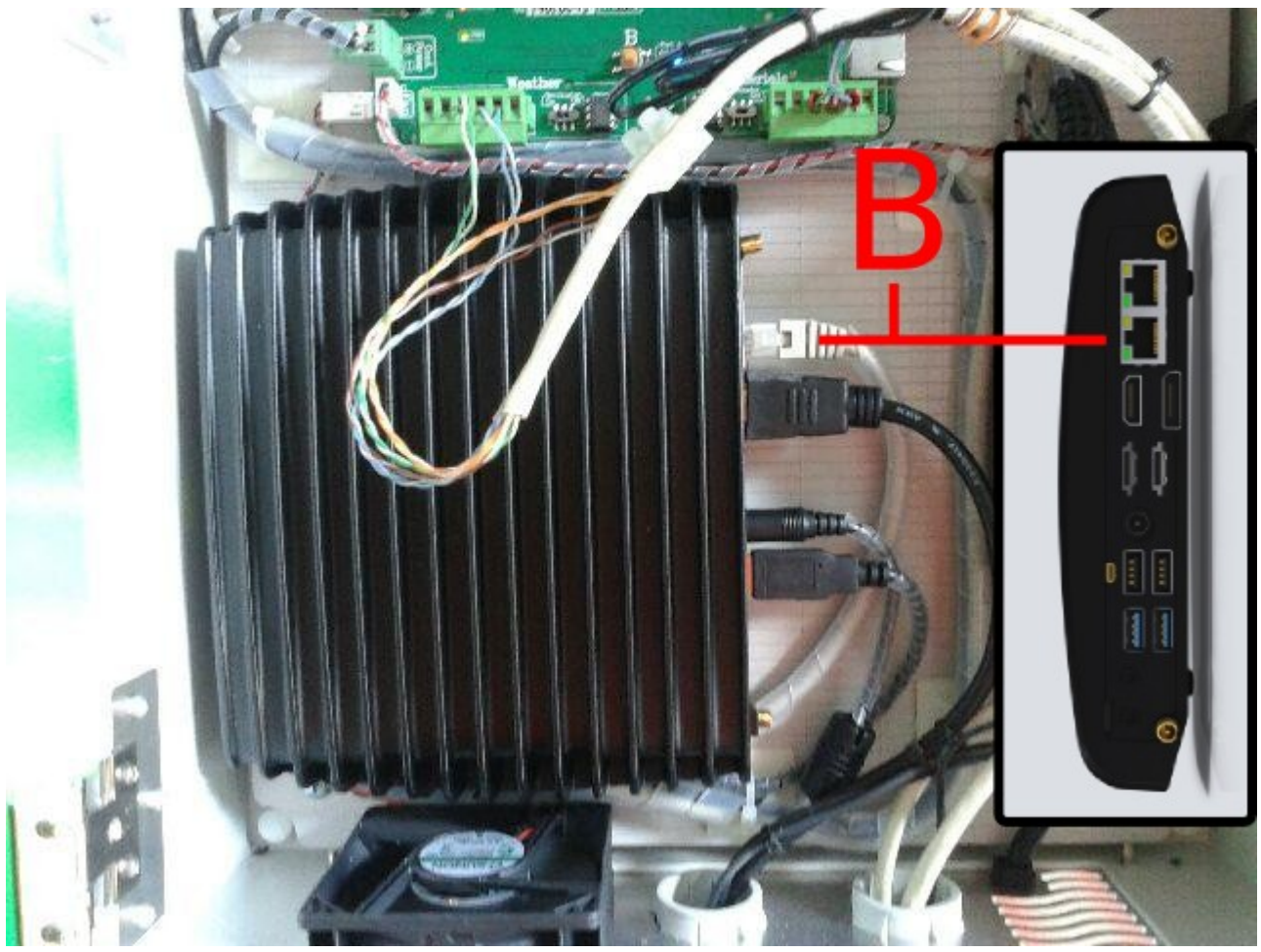


Where an ethernet cable plugs into an ethernet socket on a Multigrow control unit there should be two link lights on the socket itself that light up when there is an active connection to the network. The image below shows the green and yellow link lights on a Screenless Multigrow:

The location is labelled **B** in the following image:



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On a Touchscreen Multigrow the plug is located on the bottom of the Touchscreen unit that is attached to the door of the box, marked as **C** on the following image:

/uploads/network-plug-location-touchscreen.png

If the link lights on socket **B** or **C** are **not active** then there are three possible problems:

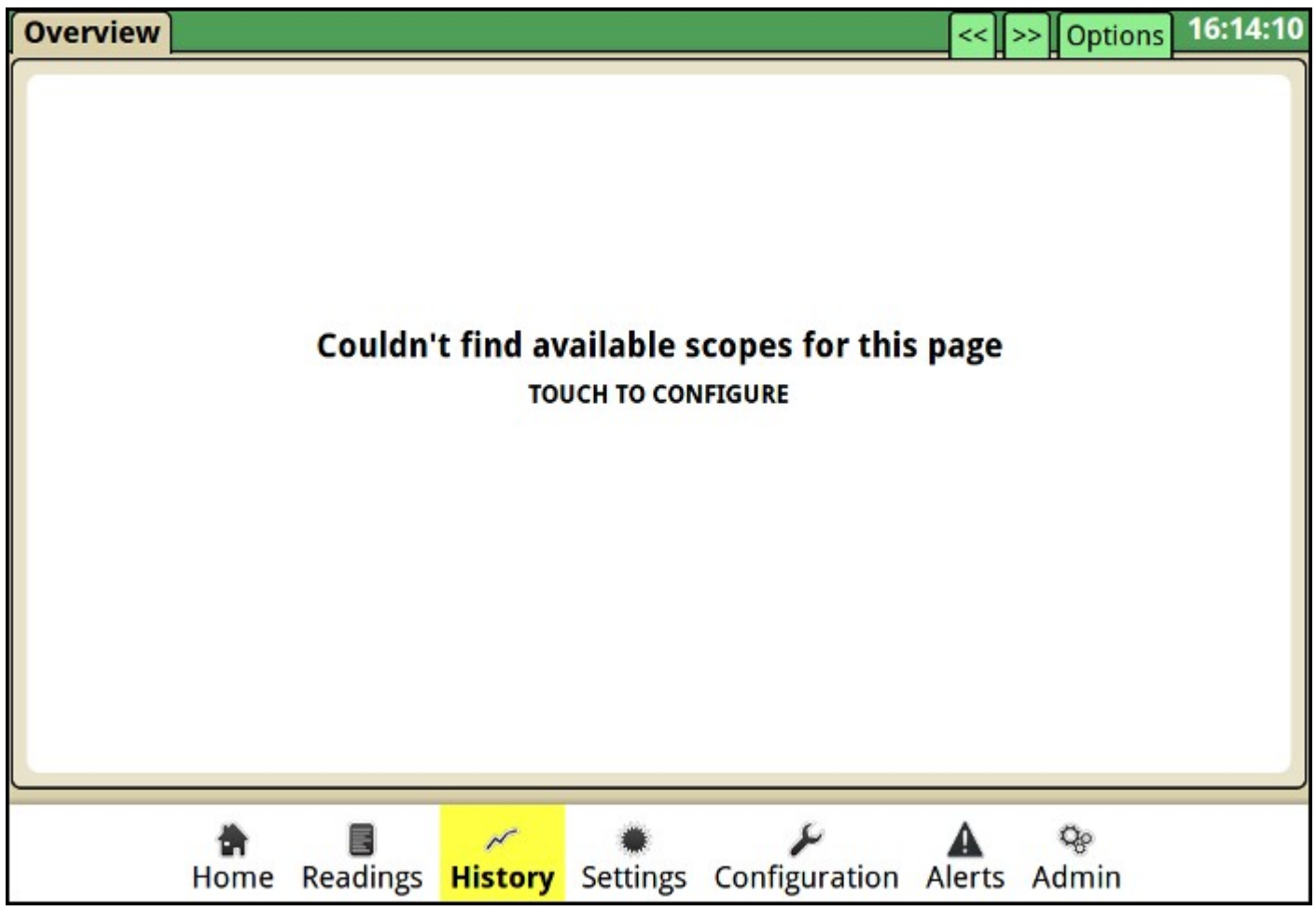
1. the short ethernet cable running from **Z** to **B**/**C** is faulty or unplugged (least likely)
2. the **5V0 Pwr** switch is turned off (see the section titled ***No devices are communicating and there is no USB or ethernet***)
3. the ethernet cable running from socket **A** to the network is unplugged or faulty (most likely)

If all the links lights on socket **B**/**C** are active (either solid or blinking) then the Multigrow is properly connected to the network.

History

I can't view history, the message "Couldn't find available scopes for this page" is shown

If you are getting a screen with a message like this:



Then this usually signals that there is a bug in the code. This is a rare occurrence and will need to be handled on a case by case basis so if you see this message please contact Autogrow Systems Limited for assistance.

The history loading screen is taking forever!

If the loading screen is taking forever to finish, this could be due to one of two things.

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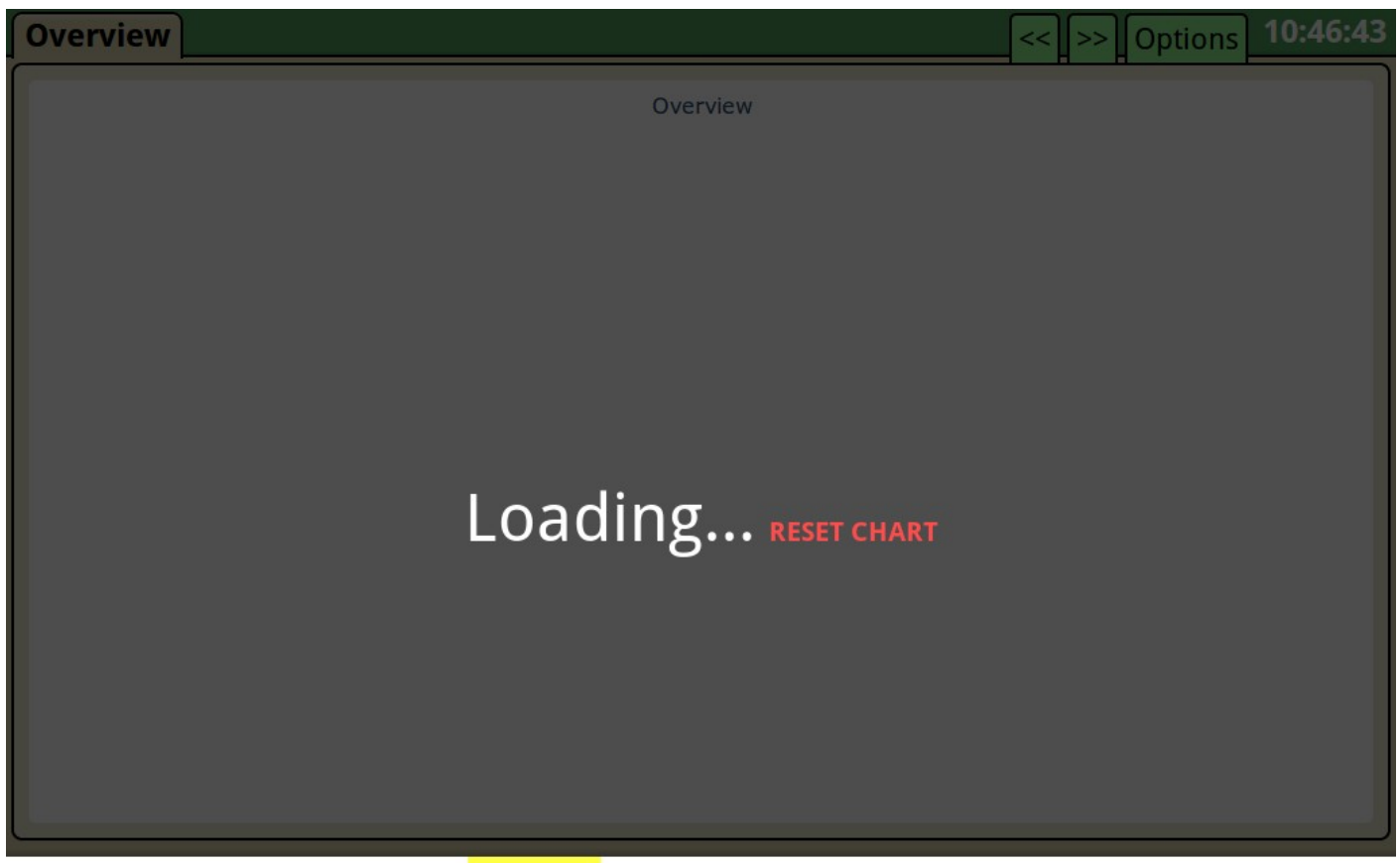

If the series and date range you selected needs to query and process a lot of data, **it may take up to a minute before the graph will draw again**.

However if the loading screen has been visible for more than a minute, it may be due to a caching problem with your browser. This occasionally happens and can be resolved in two ways.

- by pressing the red **RESET CHART** button on the loading screen
- by refreshing your browser cache (see http://www.refreshyourcache.com/ for information)

Why are there question marks on the table?

This is because there is data missing in the database. This can be due to a number of factors:

- the Multigrow was powered off at the time
- the sensors were not reporting for some reason (check the alert log for error alerts)

Why are there exclamation marks on the table?

This is due to invalid data points being generated for the table view - the graph view should display them properly. We are still trying to track the cause of this so if you see it, please drop us an email at help@autogrow.com with which series were affected and at what date and time.

Irrigations

My irrigations are getting triggered by solar during the night!

We have had a case before where the neighbour of one of our customers had an outside light that came on during the night. This was causing the irrigations to trigger due to solar. Please check that there are no intense light sources that could be triggering the irrigation during the night or make sure the solar triggers are disabled at night.

Generic

I am seeing "XX" displayed where there should be readings

This can happen when a device is not communicating properly. See the section titled ***Checking the communications*** for how to tell if the devices are communicating. Also, navigate to **Alerts > Errors** to see if there are any errors present. When you see XX displayed instead of readings it usually means there is an "Invalid Reading" or "Fuse Blown" error.

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I am seeing some other unexpected behaviour that is not listed here

We are interested to know of any unexpected behaviour or bugs in the system that are discovered so that we can fix them. If you see anything that you think may be a bug, please call us or drop us an email at help@autogrow.com. Be sure to include details about how to repeat the unexpected behaviour.

Appendix

Licences

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